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DISEASE CONTROL AND INTERNATIONAL TRAVEL

A Review of the International Sanitary Regulations

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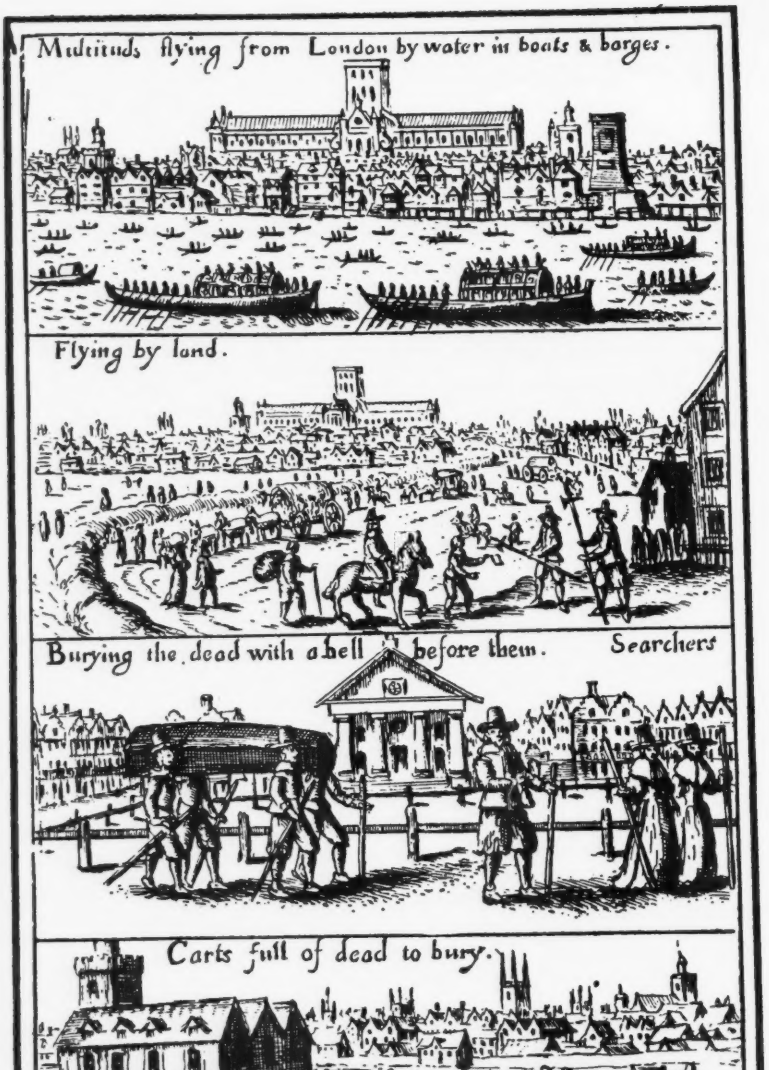

Multitudes flying from London by water in boats & barges.
Flying by land.
Burying the dead with a bell before them.
Searchers
Carts full of dead to bury.

Scenes in London during the Great Plague. From a print in the Pepysian Collection.
(By courtesy of the Clarendon Press, Oxford. In : Hirst, L. Fabian (1953) *The conquest of plague*)

HISTORICAL INTRODUCTION

EARLY QUARANTINE PRACTICES

The history of sanitary legislation has been a reflection of the evolution of theories and knowledge of the epidemiology and control of the relevant communicable diseases. When disease was thought to originate only in an obviously sick person, preventing its spread seemed a simple matter : isolate the sick, and the infection should be contained. However, isolation of the sick did not stop the spread of infection; this was so even in the days when travel was slow and along well-known routes, and when the threat of the death penalty was there to persuade the sick to obey instructions to remain apart from their fellows.

It is not certain when and where isolation for a specific period was initiated. Some writers claim that it was first used by the Republic of Ragusa in 1377, but others attribute its introduction to the Republic of Venice. There is general agreement, however, that a 40-day period, or *quarantenaria*, early became established as the usual period of isolation of sea-borne travellers and goods suspected of harbouring infectious disease. It is from this that the word " quarantine " has come. Venice set up a quarantine station, called a " lazaretto ", at the beginning of the fifteenth century. Other cities and countries gradually followed her example until some form of sanitary regulation became general in many countries during the next five centuries.

The underlying idea of quarantine was that the passage of time would give dormant disease time to manifest itself and would lead to " dissipation " of the infection brought by persons or goods from an infected area. Some of the resulting practices have been described by McDonald:

> Quarantine was indeed a strange and marvellous ritual in the Mediterranean and Adriatic ports, where lazarettos abounded, and the law was vigorously enforced. On arrival, the ships would be visited by the quarantine officer who, making elaborate use of iron tongs and vinegar, would examine the bill of health and prescribe quarantine accordingly. For plague the highest rigour was enforced for 80 days. Goods were exposed on deck or turned daily for 20 days. If cotton were part of the cargo, the bales would be broken open, and the expurgators would throw the contents over their heads daily for 60 days. If no man contracted plague, the cotton was considered free from infection. Meanwhile the crew and passengers were confined to the lazaretto and examined daily for tenderness in the axillae and groins. This procedure was modified in the case of healthy ships from infected ports. The period was reduced to 20 days, and the examination of the cotton to the thrusting of a bare arm into each bale. In some places the authorities took far less interest and merely locked everything and everybody up for a period of 20-40 days, and took further action only if cases occurred.[1]

Opposition to quarantine ultimately came from several quarters: those who were medically sceptical about its worth, those who were opposed to it on grounds of principle, and those who were inconvenienced by it.

Among those who objected on medical grounds were the " miasmatists ", who included some of the outstanding sanitary reformers and who disclaimed the contagion theory and therefore doubted the actual usefulness of quarantine. Based as they were on suppositions rather than scientific knowledge of the diseases against which they were directed, obstructive quarantine measures were destined to fail as often as to succeed; in fact, one can attribute most of the successes to good fortune rather than good management.

[1] McDonald, J. D. (1951) *Bull. Hist. Med.*, **25**, 22

Political opposition came from those who saw in quarantine an instrument for State interference in private affairs. Such criticism was not without justification in view of the arbitrariness of quarantine laws and the power of life and death accorded therein to quarantine authorities. As late as 1825 the last Quarantine Act in England prescribed the death penalty, under certain circumstances, for persons communicating with a ship in quarantine.[2]

Protective dress of a Marseilles doctor, 1720, after Manget, 1721

By courtesy of the Clarendon Press, Oxford. In : Hirst, L. Fabian (1953) *The conquest of plague*)

Innumerable illustrations of serious inconveniences caused by quarantine practices could be cited. John Howard, the English prison reformer, and J.-J. Rousseau are among those who have given first-hand descriptions of the discomfort and extreme disagreeableness of confinement in eighteenth-century lazarettos. Earlier experiences were doubtless even more depressing.

Improved means of transport and growth of trade, particularly following the revolution in transport which resulted from the use of steam, made the encumbrance of quarantine even more unbearable than it had been before. One of the most striking examples of the hardships which passengers sometimes had to bear less than seventy-five years ago was the misadventure of those aboard the Italian ship Matteo Bruzzo, which sailed from Genoa for Montevideo on 30 September 1884. Cholera broke out on the ship on arrival at Montevideo, and it was refused permission to land either there or at Rio de Janeiro. It returned to Italy and was quarantined at the island of Pianosa, near Elba. When the passengers of the ship finally disembarked at Leghorn, they had spent nearly four months to go a distance of 78 miles.

The helplessness of governments in the face of such pandemics as those of cholera in the nineteenth century, the conflicting theories as to the origin and manner of spread of disease, and the increasing impatience of commercial interests with the damage caused by quarantine restrictions, which varied from one country to another and which seemed, in any case, too ineffective to warrant their application—all contributed to preparing the ground for international action on quarantine regulations.

THE INTERNATIONAL SANITARY CONFERENCES OF THE NINETEENTH CENTURY

First conference

Although proposals for an international conference on quarantine matters had been made in 1834 and 1843, it was not until 1851 that the first international sanitary conference actually got under way. It was sponsored

[2] Goodman, N. M. (1952) *International health organizations and their work*, London, p. 34

by the Government of France and opened in Paris on 23 July. Twelve States—Austria, the two Sicilies, Spain, the Papal States, France, the United Kingdom, Greece, Portugal, Russia, Sardinia, Tuscany, and Turkey—were represented, each by a diplomat and a physician, since the conference was to be both technical and general.

The various epidemiological theories of the day were aired, and certain views on quarantine emerged. The United Kingdom was strongly against any quarantine. The Mediterranean countries and Russia were for strict quarantine measures. Austria considered quarantine against cholera unnecessary. France was in an intermediate position, trying to reconcile commercial interests with quarantine measures prompted by fear of epidemics such as that of plague which had struck Marseilles in 1720.

The conference lasted six months. Despite the many difficulties involved, an international sanitary code was prepared, comprising 137 articles dealing with cholera, plague, and yellow fever. However, the convention was ratified by only three countries : France, Portugal, and Sardinia, and both Portugal and Sardinia withdrew from the convention in 1865.

It is of interest that at this conference the Spanish diplomatic representative, A. M. Segovia, suggested the creation of an international jury in sanitary matters. This received some support from the United Kingdom and France but was opposed by most of the other countries, which protested at interference with national sovereignty.

Although the resulting convention eventually lapsed, this conference is a landmark in the history of international health cooperation and international sanitary regulations. Its significance has been aptly stressed by Goodman :

> For the first time, doctors and diplomatists officially representing twelve countries had met to discuss health problems. For the first time, an International Sanitary Convention had been drawn up embodying international rules to promote uniformity in quarantine procedure. For the first time, a number of important principles had been agreed, which were later embodied in international quarantine practice; for example, the principle that quarantine was not applicable to ships with a clean bill of health and otherwise free from infection; that maximum and minimum periods of quarantine were to apply, differing for each of the three diseases dealt with; that measures to ensure a healthy voyage should be taken at the port of departure; that quarantine stations (lazarettos) should be provided for the performance of quarantine and that they should be hospitals rather than prisons ; that ships should never be repelled from a port because of pestilential disease on board; that quarantine dues should be uniform and not regarded as a source of revenue; and that epidemic intelligence reports from independent medical officers stationed in areas from which infection came were of great value and that this system should be extended....
>
> Indeed, fifty years of subsequent international discussion failed to alter the main principles of this first International Sanitary Convention. For all these reasons, we can consider the 1851 conference as marking the beginning of international health collaboration between governments....[3]

Second conference

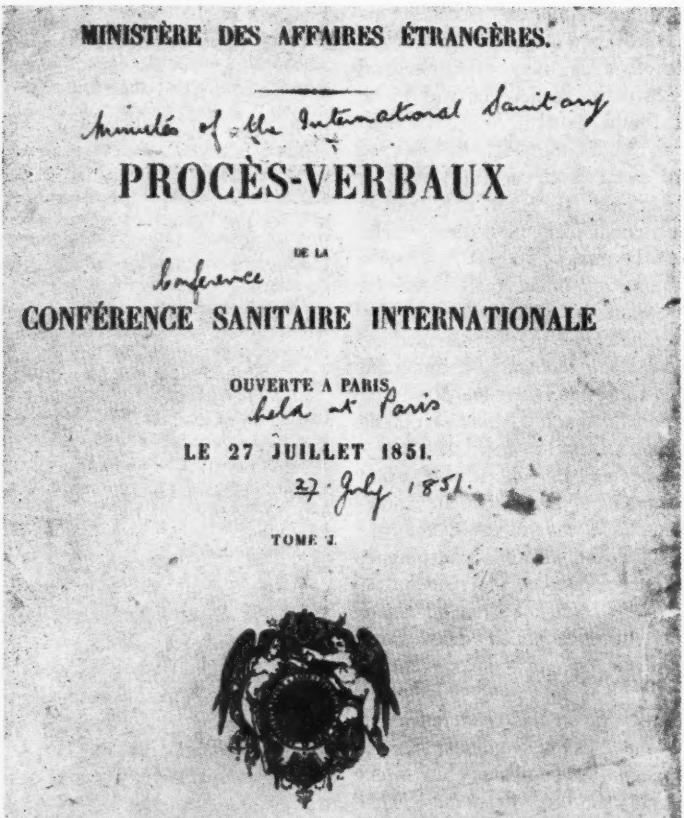
Because only three governments ratified the 1851 Convention, the French Government convened a second conference, in Paris in 1859. Diplomatic delegates from 11 countries—Austria, France, the United Kingdom, Greece, the Papal States, Portugal, Russia, Sardinia, Spain, Tuscany, and Turkey—prepared a draft convention embodying the principles of the 1851 Convention. The United Kingdom again pleaded for fewer restrictions; Greece headed those favouring strict quarantine; and France took an intermediate position.

The political unrest in Europe and the wide disagreement concerning the basic elements of the convention were the chief reasons for its failure.

Third conference

The third international sanitary conference was prompted by the fourth pandemic of

[3] Goodman, *op. cit.*, p. 45



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Minutes of the International Sanitary

PROCÈS-VERBAUX

DE LA

Conference

CONFÉRENCE SANITAIRE INTERNATIONALE

OUVERTE A PARIS,

held at Paris

LE 27 JUILLET 1851.

27 July 1851.

TOME I.

PARIS.

IMPRIMERIE NATIONALE.

M DCCC LI

Title page of the Proceedings of the International Sanitary Conference of 1851

By courtesy of J. & A. Churchill, Ltd., London. In: Goodman, N. M. (1952) *International health organizations and their work*)

cholera, which in 1865 was brought from India to Egypt by pilgrims and which subsequently spread to Europe. Quarantine was of no avail, despite the fact that the disease was " ship-borne ". The need to co-ordinate the study of cholera and to find means of stopping its spread led to a conference which opened in Constantinople on 13 February 1866 and which lasted seven months.

Delegates from 16 countries discussed: (1) the origin of cholera; (2) its transmissibility and propagation; (3) preventive measures (hygiene, quarantine and disinfection, and special measures for the Mecca Pilgrimage and in various regions); and (4) route of spread of the 1865 pandemic. The conclusions reached were very accurate considering the fact that the conference took place seventeen years before the cholera vibrio was discovered.

Fourth conference

In 1874 a fourth international conference was convened, in Vienna, at the suggestion of Russia, which was concerned at the persistence of cholera in her territory and at the quarantine to which her maritime trade was subject because of the disease. Another reason for international examination of the problem of cholera at this time was the more frequent and faster traffic in the Red Sea which resulted from the opening of the Suez Canal in 1869. Twenty-one States attended this conference. It confirmed the conclusions of the Constantinople meeting concerning cholera. Land and river quarantine were condemned as useless, but a compromise solution was found to satisfy different interests in maritime quarantine. This provided for the choice of medical inspection or quarantine as a measure to be applied to ships.

Another contribution was the drafting of a convention for a permanent international commission on epidemics. Although the convention had little effect, this proposal that a commission should be created, with suggestions for its work, represented an important development in international health co-operation.

Fifth conference

Concurrent with European developments, quarantine and other sanitary regulations were the object of international action in the Americas as well. The first application of American quarantine is believed to have been at Hispaniola in 1519, and quarantine restrictions were frequently imposed by the American colonial territories in the seventeenth and eighteenth centuries, chiefly against yellow fever. Quarantine services were set up in the major South American ports between 1810 and 1829, and in North America from 1855. The first conference on quarantine in the Americas brought together Argentina, Brazil, and Uruguay in Montevideo in 1873.

Cholera had been introduced into North America in 1832, 1848, 1854, and 1866. The continuing threat of this disease and the frequent invasions of yellow fever called for international action. In 1880 a joint resolution of the Senate and House of Representatives authorized the President of the United States to convene an international sanitary conference.

This conference, which took place in Washington, D.C., from 5 January to 1 March 1881, was attended by representatives of 26 countries; most of the delegates were diplomats rather than medical men. Among the specific problems discussed were: (1) setting up a reliable and satisfactory international system of notification of the existence of contagious and infectious diseases, especially cholera and yellow fever; and (2) instituting a uniform and satisfactory system of bills of health which would accurately indicate the sanitary condition of the

port of departure and the condition of the vessel at the time of sailing.

The latter subject was disputed, as the USA proposed that ships should be inspected before departure by the consular agents of the country of destination, who would deliver the bills of health. Since some of those present considered this a slur upon the reputation of their services and an infringement upon their sovereignty, there was much opposition. A compromise was accepted which gave the consul of the country of destination the authority to endorse the bills of health delivered by the sanitary agent of the country of departure.

A more important proposal was for a system of exchange of epidemiological information: it was suggested that a weekly bulletin be published by each country, that sanitary authorities of different countries should be allowed to communicate directly with each other, and that an international organization should be established to collect information on the outbreak, spread, and disappearance of cholera, plague, and yellow fever.

This conference dealt particularly with yellow fever. It is significant that it was here that Dr Carlos Finlay, reporting on the results of his investigations on yellow fever, expressed the opinion that there might be an agent entirely independent for its existence both of the disease and the sick person which might convey the disease from a yellow-fever patient to a healthy individual.

This conference did not result in any convention, but many important questions were discussed, understanding among the participating countries was increased, and the way was prepared for future developments.

Sixth conference

"The history of the earlier international sanitary conferences is one of nations driven to international negotiation by a common danger but completely unable to reach agreement because of the limitations of scientific knowledge."[4] In the latter part of the nineteenth century, however, the work of Koch, Pasteur, and others gave the conferences some of the scientific bases which they needed. Koch's announcement of his discovery of the cholera vibrio in 1884 was a significant milestone and supported the theories of the "contagionists".

But, despite an outbreak of cholera in Egypt in 1883 and the advances in knowledge of the disease, the British, partly because of commercial interests and firm in their belief that the means of preventing the spread of cholera lay in sanitary improvements and precautions, continued to protest against the system of quarantine restrictions. The time was ripe for another international discussion to find solutions to some of the increasingly urgent problems. Accordingly, a conference was opened in Rome on 20 May 1885, sponsored by Italy.

Twenty-eight countries sent 63 delegates, of whom 31 were medical men. Discussion proceeded smoothly until the question of quarantine at Suez was broached. In spite of British opposition, supported to some extent by Denmark and the USA, which had given up quarantine in favour of medical inspection, the conference recommended surveillance of 24 hours for healthy ships and a quarantine of three to six days for healthy persons in infected ships. Again, no convention resulted: the findings of the conference remained simply recommendations—without the legal sanction to give them any real authority.

Early conventions

The last decade of the nineteenth century saw a series of international sanitary conferences. These succeeded in preparing a number of limited conventions.

[4] Howard-Jones, N. (1950) *Brit. med. J.*, 1, 1032

In 1892, 14 States met at Venice to discuss the transmission of cholera by sea, particularly in relation to the Mecca Pilgrimage. A convention was signed and ratified which dealt primarily with the Suez Canal and the pilgrimages. The system of limited protection which it set forth remained valid for some time.

The eighth international sanitary conference, held in Dresden in 1893, brought together representatives of 19 countries. It resulted in a convention, signed by ten nations, which specified minimum and maximum measures for quarantine against cholera, with the intention of protecting European countries from outbreaks such as one which had reached France, via Afghanistan, Persia, and Russia, in 1892. This convention was ratified by 11 countries in 1897.

A conference in Paris in 1894 dealt in greater detail with measures for the Mecca Pilgrimage and the Persian Gulf. A convention was signed by 13 States, but never came into effect, largely because of the failure of Turkey, one of the countries most concerned, to ratify it.

In 1897, the tenth international sanitary conference was convened, in Venice. This, like many of its predecessors, was the result of the threat of an epidemic: plague, thought to have originated in China, had broken out in India. A convention was signed by 18 countries; it dealt with quarantine measures to be taken inside and outside Europe, against ships; with disinfection; and with the associated administrative means. It is of interest that compulsory telegraphic notification of the first cases of plague was unanimously accepted. Although not very effective, this convention represented another noteworthy step in international agreement on health matters.

Summary of nineteenth-century achievements

The nineteenth-century conferences made slow but steady progress. They contributed significantly to developments in health legislation and organization. First, they led to the acceptance of international discussion as a means of examining such controversial questions as the effect of medical action on intercountry trade. Secondly, they brought arbitrary and even corrupt practices condoned in the name of quarantine under the correcting influence of public debate. Thirdly, they showed the theoreticians—contagionists, miasmatists, and others—the serious consequences for many countries of the application of their unproved beliefs. The search for more rational and scientific premises was consequently hastened. Fourthly, they drew attention to the desirability of uniformity of practice in quarantine matters. Finally, they led to the preparation of international sanitary conventions which eventually led to the establishment of the first international health organizations.

TWENTIETH-CENTURY CONFERENCES AND CONVENTIONS

A conference of major shipping companies in Vienna in 1902 was instrumental in the convening of the first international sanitary conference of the twentieth century. The latter, held from 10 October to 3 December 1903 in Paris, culminated in the signing of the International Sanitary Convention of 1903, which consolidated the conventions of 1892, 1893, 1894, and 1897. Masters has summarized its salient points as follows:

> This convention substituted for the anarchy which had heretofore existed a cooperative scheme for combating epidemics based on the assumption by each signatory state of two important obligations: (1) to notify all other signatories of the appearance in its territory of certain communicable diseases specified in the convention; and (2) when so notified, to refrain from imposing against a stricken country defense measures in excess of the maximum permitted by the convention. . . .
>
> In addition to the above-mentioned principles which apply to all signatories, the 1903 convention contained special provisions for the Suez Canal and neighboring

countries which were designed to establish under international administration a barrier against disease at strategic points on the Suez Canal, the Red Sea, and the Persian Gulf; it also provided detailed regulations for the Moslem pilgrimages. . . .[5]

In the meantime, regional and general international attempts at sanitary regulation were taking place in the Americas. The First and Second International Conferences of the American States in 1889-90 and 1901-02 led to the creation of the Pan American Sanitary Organization (PASO) and the Pan American Sanitary Bureau (PASB) in 1902. The PASO and PASB prepared the Washington Sanitary Convention of 1905, which was modelled on the Paris convention.

To return to Europe, an event of great importance took place in 1907. By an agreement signed in Rome, the first truly world-wide organization to deal with international health matters, especially with quarantine, was set up in Paris—the Office International d'Hygiène Publique. The Office fulfilled important functions for 40 years, and its duties and powers became part of the legacy inherited by WHO at the New York International Health Conference in 1946.[6]

Advances in bacteriology and epidemiology, in particular the discovery that a healthy person could be a carrier of cholera and the final confirmation of the role of the rodent in plague, necessitated revision of the 1903 convention. Medical and diplomatic representatives of 41 countries met in Paris in 1912 to undertake the necessary improvements. The most important changes concerned yellow fever. There was a general acceptance of the principle of less stringent quarantine practice. The First World War prevented the application of this convention until 1920. It was shortly superseded by the 1926 convention (see below).

In 1924, the Pan American Sanitary Code was signed by 18 American republics. This code, intended for inter-American practice, was based largely on the international sanitary conventions.

After the First World War, the Office International d'Hygiène Publique undertook revision of the 1912 convention. At a conference in Paris, the well-known International Sanitary Convention of 1926 was signed. With this convention typhus and smallpox were added to the list of " pestilential " diseases.

The 1926 convention, partly modified in 1938, represented the ultimate achievement of the movement begun in the nineteenth century for a compromise between contending medical theories and between these and the practical needs of international movement of people and goods. The 1926 convention became the charter for the guidance of travellers, shipping and trade interests, and port sanitary services.

The growth of international aviation led to the signing of the International Sanitary Convention for Aerial Navigation, at the Hague, in 1933. This was based on the same principles as the 1926 convention, suitably adapted to the conditions of air travel.

Both the 1926 and 1933 conventions were amended, under the aegis of the United Nations Relief and Rehabilitation Administration (UNRRA), in 1944, in Montreal. These revisions came into force when they were signed by 17 States in Washington, D.C., on 15 January 1945.

* * *

When WHO took over international quarantine matters—a subject to be considered in a later section (page 313)—the situation with regard to quarantine practice was considerably confused and certainly unsatisfactory. Not all of the countries signing the original conventions had adopted the 1944 revisions or the 1946 protocols prolonging them (see Annex 2, page 333). Some of the

[5] Masters, R. D. (1947) *International organization in the field of public health*, Washington, D.C. (Advance print of a chapter on public health in the forthcoming *Manual of International Organization* of the Division of International Law of the Carnegie Endowment for International Peace), p. 9

[6] *Off. Rec. Wld Hlth Org.*, 1948, **2**, 28

countries most concerned in maritime and air travel were bound by obsolete conventions or by none at all. Many quarantine measures were not sound scientifically and, in addition, caused serious disturbance to travel and trade.

It was a full century after the first international sanitary conference had been held that the International Sanitary Regulations, adopted in 1951, brought some order out of chaos. Nevertheless, this century had shown some remarkable progress in quarantine practice: There were the beginnings of modern epidemiology to demonstrate the complexity of the transmission of disease, and consequently the unsoundness of the previous theories that isolating obviously sick people or holding " contacts " or suspected ships could contain a disease. There was the recognition of the claims of people, ships, and goods against arbitrary and excessive interference and obstruction in the name of " quarantine ". There were the large reforms of sanitation, which led to much reduction in the severity of communicable disease. There was the acceptance of scientific investigation as a guide to international action in preparing quarantine measures. There was a willingness to bring national difficulties of relationships to the forum of the international conference.

THE QUARANTINABLE DISEASES: A CHANGING PICTURE

The so-called " quarantinable " diseases are cholera, plague, louse-borne typhus, relapsing fever, smallpox, and yellow fever. These diseases have been the cause of the great " plagues " of history, and are those against which quarantine measures have been chiefly directed, both in earlier sanitary conventions and in the present International Sanitary Regulations. Death and disturbance have been brought by them to all continents, and until the twentieth century there were no certain means of avoiding them. Pandemics of some of them have competed with wars in providing history with its more lurid episodes: the plague of Justinian, the Black Death of the fourteenth century, the Great Plague of Europe of the seventeenth century, the cholera pandemics of the nineteenth century, the typhus and relapsing fever epidemics associated with many wars and famines, and frequent smallpox outbreaks in most countries have spread destruction and dismay.

The quarantinable diseases are not the only ones which have caused mass sickness and death: influenza, for example, has on occasion matched and even surpassed the quarantinable diseases in pandemic severity; and such infections as scarlet fever, measles, dengue, malaria, typhoid, and whooping cough have frequently been devastating in their effects. Nevertheless, it is the quarantinable diseases which have for a long time been the principal destructive agents, crossing boundaries and menacing communities everywhere. It is they which have provoked government and health authorities to attempt to stop their spread by international co-operation; it is their association with trade routes, pilgrimages, armies, and population movements in general which has brought concerted international action against them and their suspected vehicles of travel, whether land caravan, ocean-crossing ship, or modern inter-continental aircraft.

Le regime contre epidimie

et peſtilence. Intitule aux poures: par le quel vng ⁊ chaſcun de quelque complexion quil puiſſe eſtre peut voir et congnoiſtre les choſes qui luy ſont reſeruees vtiles et prouffitables pour les vſer et ſoy preſeruer. A lopposite il pourra entendre et clerement congnoiſtre les choſes nuyſantes ⁊ cauſantes lad. peſtilence: a celle fin de les fuyr euiter ⁊ delaiſſer. Et auec ce il pourra par ledit regime faire de ſoy ⁊ compoſer pluſieurs excellens remides ſans grand peine ne couſtage cõtre leſd. maladies.

Title page from Le regime contre epidimie, *by Thomas Le Forestier, Rouen, 21 October 1495. A formulary of prescriptions and instructions for protection against epidemics*

(By courtesy of E. Droz, Geneva. In : Klebs, A.C. & Droz, E. (1925) *Remèdes contre la peste : fac-similés, notes et liste bibliographique des incunables sur la peste*, Paris)

Before reviewing the introduction and application of the present International Sanitary Regulations, the recent history and present position of each of the quarantinable diseases will be briefly summarized.

CHOLERA

Although cholera had been endemic certainly in India, and probably in China, for centuries, no westward spread of the disease occurred until the nineteenth century. The pandemics of that time were significant not only because of the destruction they caused everywhere, but also because of the direct influence they exerted on theories of contagion and infection and the impetus they gave to international health co-operation, as has been shown in the previous section.

As Pollitzer has pointed out, "When trying to deal in a summary manner with the geographical distribution of cholera throughout the world, it is far easier to refer to the few areas unaffected by this scourge than to enumerate the many countries where the presence of the disease has been recorded."[1] Cholera has never established itself in extreme northern or southern latitudes; and, even when introduced, it did not, curiosly enough, become a local infection in the ports of South Africa. It also failed to secure a permanent hold on most islands and countries in the Pacific area.

The first pandemic commenced in 1817 and in the following six or seven years reached Ceylon, Burma, Thailand, the Indonesian archipelago, China, Japan, the Persian Gulf, the Caspian area, and the Levant—and, apparently, Zanzibar and Mauritius. The second pandemic is considered to have had its origin in an epidemic in Bengal in 1826, extending, in the years 1829 to 1836, via Persia and the Caspian, to Russia, most of Europe, North Africa, and then across to the Americas. The spread eastwards was noted by observers in Burma, the Philippines, and China from 1840 to 1846. The infection persisted in Europe and America throughout the fifth decade of the century, with heavy incidence in both continents in 1849.

The third pandemic, which began in 1852, did not show so clearly a progressive spread from a single place of origin but flourished in Europe, North America, the eastern Mediterranean region, North Africa, Indonesia, China, and Japan. In some of these areas it maintained itself until the end of the decade.

A particular feature of the fourth pandemic, which lasted from 1863 to 1873, was its impact on the Mecca pilgrims. Fear of the Mecca Pilgrimage as a cause of spread of cholera followed, and has continued until very recent times (see page 323). This fourth pandemic again affected Europe and America and invaded both the east and west coasts of Africa. In the Americas, it extended to Central and South American countries. It also reached most of Asia.

The fifth pandemic, beginning in 1881, was significant in that its effects were reduced or eliminated by counter measures in Great Britain and North America. However, it resulted in severe outbreaks in Russia, Germany, France, and Spain; Brazil, Argentina, and Uruguay; and Persia, China, Japan, and the Philippines.

The sixth pandemic manifested itself in outbreaks spread over a number of years from 1899 until the 1920's. Apart from the usual violent epidemics in India, its country of origin, it caused havoc in Russia, the Balkan countries, the countries associated with the Mecca Pilgrimage, and most countries of the south-east Asia and northern Pacific regions.

Since the early years of the second decade of the present century, a dramatic change has taken place in the world distribution and spread of cholera. Europe, the Americas,

[1] Pollitzer, R. (1954) *Bull. Wld Hlth Org.*, 10, 421

Africa (except Egypt), Japan (except for a brief return in 1946), and Australasia have been completely free from the disease. It has become evident that cholera is the product of a few foci in India and Pakistan.

Present position

The present position of cholera can best be considered in the light of events since the Second World War. With but one exception, cholera has not spread outside Asia. Even there, its extensions from its endemic sources have markedly declined; recently only a few scattered outbreaks have occurred beyond the central Asian core. These exceptional appearances were in Japan in 1946, Egypt and Syria in 1947, and Indochina in 1947-52.[2, 3]

[2] Swaroop, S. & Pollitzer, R. (1952) *Epidem. vital Statist. Rep.*, 5, 569

[3] Swaroop, S. & Pollitzer, R. (1955) *Bull. Wld Hlth Org.*, 12, 311

The countries with significant outbreaks of cholera in the post-war period have been India, Pakistan, Burma, Thailand, Indochina, and China (see Table I). The examination by Swaroop & Pollitzer [3] revealed that of the total recorded cholera deaths from 1948 to 1952, those in India and Pakistan together accounted for 98%; if Burma were included as well, the figure would become 99.5%. The endemic foci proper are considered to be East and West Bengal and the deltaic region of the Ganges and the Brahmaputra; less important foci are found in the deltas formed by the Mahanadi in Orissa State, the Cauvery, the Kistna, and the Godavari in Madras State, and, possibly, the Irrawaddy delta in Burma. These authors conclude that the recent data available confirm earlier views that, in spite of devastating epidemics and long-continuing incidence, the Chinese river deltas are not true endemic foci.

TABLE I. CHOLERA DEATHS RECORDED IN VARIOUS COUNTRIES * FROM 1945 TO 1954 †

Country or territory	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954 [a]
India and Pakistan	278 498	122 817 [b]	131 758	194 920	95 410	110 929	62 550	59 156	133 830	18 800
Burma	6 220	2 482	500	33	135	2 446	4 685	238	9	19
Ceylon	5	31	0	0	2	0	0	0	11	0
Thailand	3 954	4 560	2 036	15	1	0	0	0	0	0
Indochina	—	—	714	540	21	8	61	17	22	4
China	5 201	15 460	281	3	0	0	—	—	—	—
Shanghai	143	353	—	—	—	—	—	—	—	—
Hong Kong	—	246	0	0	0	0	0	0	0	0
Taiwan	—	2 210	0	0	0	0	0	0	0	0
Malaya	—	182	0	0	0	0	0	0	0	0
Japan	0	528	0	0	0	0	0	0	0	0
Egypt	0	0	20 462	10	0	0	0	0	0	0
Syria	0	0	0	18	0	0	0	0	0	0

* Other countries for which data are available : no cholera deaths were recorded from 1945 to 1954 in Java (Indonesia), USSR, Iran, and Iraq ; from 1946 to 1954 in the Philippines ; and from 1947 to 1954 in Singapore.

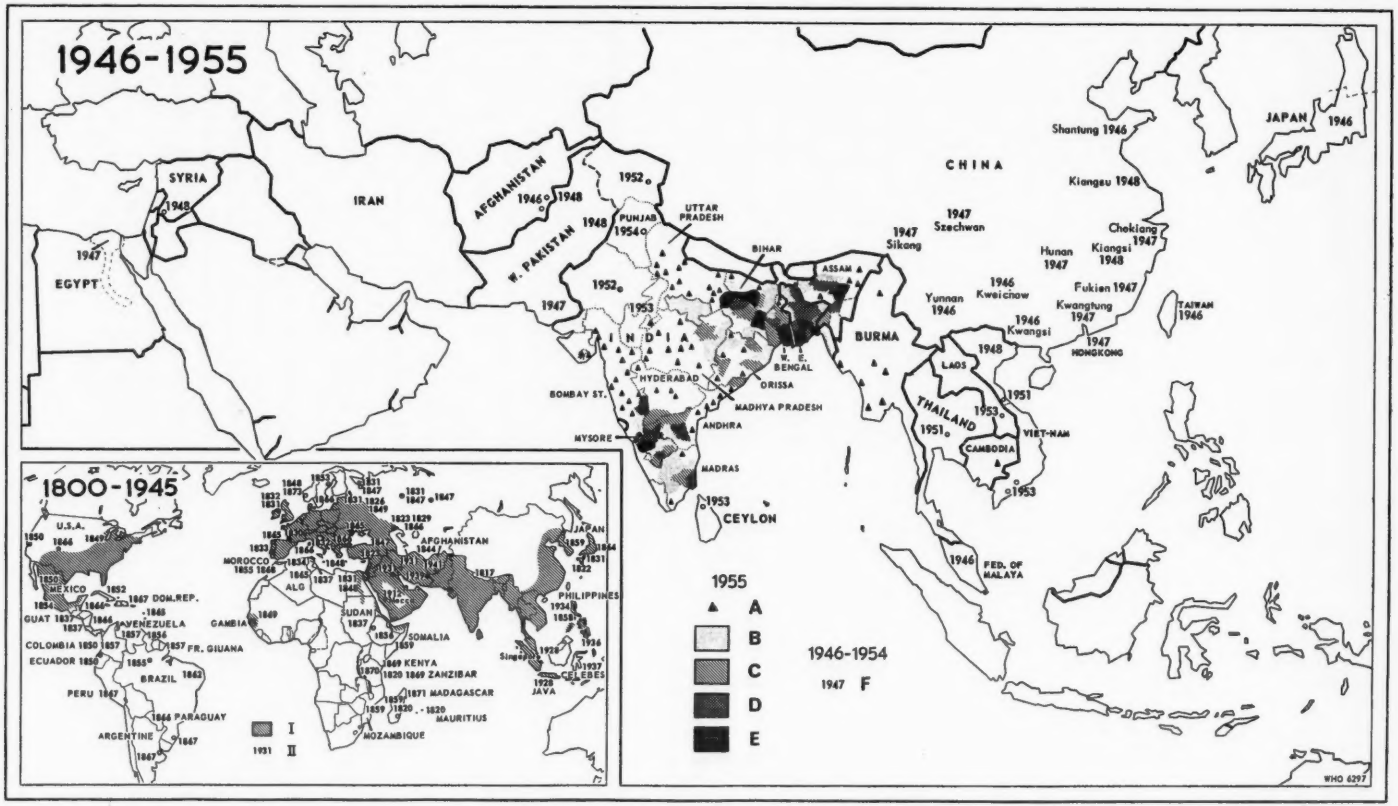
† Adapted from Swaroop, S. & Pollitzer, R. (1955) *Bull. Wld Hlth Org.*, 12, 311

— = Figures not available

[a] Provisional figures [b] Excluding figures for East Bengal

MAP 1. CHOLERA DISTRIBUTION, 1800-1955

MAP 1. CHOLERA DISTRIBUTION, 1800-1955



Main map : Distribution by districts, based on provisional notifications of cases in 1955

A = *1-25 cases*
B = *1-9 cases per 100 000 of the population*
C = *10-19 cases per 100 000 of the population*
D = *20-49 cases per 100 000 of the population*
E = *over 60 cases per 100 000 of the population*
F = *date of last occurrence during period 1946-1954*

Inset map : I — areas affected 1879-1911
II — date of last occurrence during period 1800-1946

East of India and Pakistan, cholera has occurred annually in Burma and Thailand, but to a markedly decreasing extent in the latter country. Thailand had an epidemic from 1943 to 1947, and China suffered a generalized outbreak in 1946. During the years 1945 to 1954 there were a few cases yearly in Indochina.

In recent years cholera has dwindled in importance to the point of being a problem only in its endemic foci in India and Pakistan and in the immediate vicinity of these foci. Elsewhere, cholera has disappeared, with a very few exceptions—explained, perhaps, by post-war disturbances. There has been significant improvement even in its traditional endemic "home" (see Map 1). Cholera deaths recorded during the five years 1950-54 in India and Pakistan were as follows: 110 929 in 1950; 62 550 in 1951; 59 156 in 1952; 133 830 in 1953; and about 18 800 in 1954. The total of approximately 385 000 deaths compares favourably with the 824 000 reported during the previous five-year period (1945-50) and is the lowest on record.

Cholera and international travel

Since the Second World War the spread of cholera through international travel has been practically unknown. Despite various theories, among them probable importation from India, the outbreak in Egypt in 1947 [4] could not be ascribed definitely to any specific origin. Similarly, the various outbreaks in other countries where the disease is not endemic have not been definitely traced to their origin.

In the period 1950-55, only 13 ships were declared on arrival at port of destination to have cholera cases on board; and none of the cases resulted in secondary infections. All these cases were found in Indian ports and were on ships coming from local or adjacent ports. No such cases were reported elsewhere, a situation very different from that in earlier years.

The last epidemic in Mecca occurred in the years 1910-12. Since 1913 the Pilgrimages have remained free from cholera, with one possible exception: the 1930 Pilgrimage was considered infected because in May a pilgrim returning from Mecca was found to have symptoms of the disease when he landed at Massawa, Eritrea.[5] However, no case of, or death from, cholera was reported in the Hedjaz.

* * *

The marked decline in world importance of cholera is undoubtedly a reflection of an improvement in sanitary conditions everywhere, in countries themselves and in international transport: because of the former, cholera is unlikely to gain a foothold even if it is introduced; thanks to the latter, its spread by land and sea is made more improbable.

PLAGUE

The first definite historical record of plague is that of the pandemic of the sixth century A.D., in the time of the Emperor Justinian. Its devastating effects on the then-known world were such as to cause it to be described as "one of the worst calamities that ever befell mankind".[6]

The next widespread catastrophe caused by plague was the notorious Black Death of the fourteenth century. This was a true pandemic; historians of both the East and the West tell of the appalling toll of human life which it took everywhere, over a period of many years. Its victims in Europe and Asia are known to have numbered millions. On this occasion plague was so destructive as to have brought organized human society

[4] See *Chron. Wld Hlth Org.*, 1947, 1, 141, 157.

[5] Swaroop & Pollitzer (1955) *op. cit.*

[6] Pollitzer, R. (1954) *Plague*, Geneva (*World Health Organization: Monograph Series*, No. 22), p. 12

almost to an end. The epidemiological factors of this plague of the fourteenth to sixteenth centuries, especially those associated with the rat and the movements of people and trade, have been zealously studied in an effort to find a clue to the subsequent disappearance of the disease from many countries. By the 1840's, for example, plague had disappeared from Europe. The complete explanation is yet to be found, in spite of the influences of changes in rat species, housing conditions, harbourage, trade routes, and other factors.

A pandemic of plague occurring in the latter half of the nineteenth century and the early years of the present century is considered to have originated in the uplands of south-east Asia, in Yunnan, from where it was brought down to Canton and Hong Kong; from there, maritime traffic distributed it to many ports and countries all around the globe. This spread of the disease produced the present distribution and conditions of plague and its consequent interest for international quarantine.

Present position

It is convenient to consider the distribution of plague by continents for the past five years.

Asia

In China, human plague has frequently occurred in both coastal areas and in the interior. Manchuria was the scene of notorious pneumonic plague epidemics in 1910 and 1920; and outbreaks of human infection were also reported at various times during this period in the provinces of Kwangtung, Fukien, Chekiang, Kiangsi, Shantung, Anwhei, Shansi, and Yunnan. Pollitzer states, in this connexion, " rat-caused plague is entrenched in parts of south China as well as in the north-west of the country and recently perennial outbreaks of the same type occurred in Yunnan as well." [7]

Burma, Indochina, Thailand, Indonesia, and India all have areas of endemic human plague which have produced significant outbreaks each year. The most serious incidence has been in India and on the island of Java. In India particularly, plague has been a major cause of human mortality since the beginning of the century, with a steady decrease, however, in recent years, as the following figures show:

	Plague deaths	
Years	*Total*	*Annual average*
1919-1928	1 702 718	170 272
1929-1938	422 880	42 288
1939-1948	217 970	21 797
1949-1953	23 142	4 628

This decline in human plague, which is by no means necessarily a reflection of a parallel decrease in the enzootic rodent sources of the disease, has been evident in other Asian countries as well: Burma, Indochina, and Indonesia have seen significant reductions in mortality from plague in recent years. Burma has had only 3020 reported cases in the last five years (1951-55), in small, scattered foci. In Cambodia, where human plague apparently became established in the Pnompenh area in 1907, and in Viet Nam, where it became established in three areas (Saigon, the central coastal area, and the Haut-Donnai area) at about the same time, only 186 cases have been reported in the last five years. In Thailand, 14 cases were notified in the same period.

Plague was imported to Surabaya in 1910 and extended inland, causing large numbers of cases in Java, approximately 10 000 annually in the second decade of the century. During the last five years, however, this number has decreased to less than 2000 annually.

Another plague focus which gives rise to occasional human outbreaks of the disease lies in western Asia. In Iran, Israel, Iraq, Turkey, Syria, and Saudi Arabia, small

[7] Pollitzer, *op. cit.*, p. 20

numbers of human cases have been reported several times in recent years. Whether the relationship of some of these outbreaks is to local wild-rodent infection or to imported domestic-rodent infection has not been determined.

This, very briefly, is the position of human plague in Asia in recent years. It shows a reassuring decline not merely in terms of mortality and morbidity, but also in geographical extent. However, human plague is but a relatively minor expression of a much more complex and comprehensive biological phenomenon—rodent plague. Knowledge of the ecology of the Asian rodents and rodent-flea correlation, and of the epidemiology of local human outbreaks is urgently needed.

Wild-rodent plague foci in Asia—the real permanent home of the infection—can be only very roughly indicated here. The best known is the Asian focus of Manchuria, Mongolia, the Transbaikalian region, and Turkestan, with the marmot as the host. Other foci are those of Turkestan, the Transcaspian region, Iranian Kurdistan, and probably a border area of Yemen and Saudi Arabia. Indeed, there is much to suggest that these foci coalesce into one large area extending from central Asia across to the Arabian peninsula. In these regions the wild hosts are members of the Sciuridae (sisels) and Gerbillinae.

The continued existence of infection in other parts of Asia, particularly in the subcontinent of India, is not ascribed so definitely to wild rodents but is believed to be maintained by the commensal (domestic) rodents. Again, further ecological and epidemiological research is important.

Africa

In north Africa (Algeria, Egypt, Morocco, Tripolitania, and Tunisia) human plague has appeared several times in this century. The ports of Suez, Port Said, Tunis, Philippeville, and Alger were the scenes of outbreaks in the early years of the century. Severe epidemics occurred in more widespread areas, such as Upper Egypt (Asyut especially), several districts of Tunisia, departments of Algeria, and the hinterland of Morocco, manifesting the continued presence of plague in both urban and rural areas for many years. However, since 1950 human plague has not been reported in this region, with the exception of a few cases in Algeria.

The position regarding rodent plague in this part of north Africa is not clear. The association of most of the outbreaks in ports and urban areas with commensal rodents appears to have been confirmed. To what extent the wild-rodent populations have been involved has not yet been determined, though it is significant that several of the species are those susceptible to the disease. Ecological and epidemiological research is urgently needed to determine the local circumstances.

There are three other areas of Africa where some ecological and epidemiological investigations have been made: west Africa, east-central Africa, and south Africa.

In Senegal, a number of cases were reported from 1943 to 1945; but since then the region has been free from human infection, with the exception of a few cases in Mauretania (French West Africa) and Spanish West Africa. Both commensal and wild rodents have been incriminated here.

Human plague has been observed in east-central Africa, especially in Uganda, throughout the twentieth century. The distribution of reported cases during the last ten years (1946-55) has been as follows:

	Cases
Belgian Congo	300
Uganda	45
Kenya	216
Tanganyika	1194

However, incidence of plague in these countries has dwindled considerably in the last two years.

An examination of rats for plague infection

(By courtesy of the US Public Health Service)

The rodent problem is still only partly solved, but both commensal and wild rodents are involved.

In south Africa, there were outbreaks of human plague in a few of the larger towns at the turn of the century, but since then the disease has been confined more and more to isolated rural incidents. About one hundred human cases were reported in this region during the last five years (1951-55).

The rodent situation is well known: the disease is enzootic in wild rodents in certain well-defined ecological conditions. Full ecological and epidemiological investigations have been made in south Africa. This fundamental research work not only has contributed to the marked improvement in local control, but also has helped the scientific study of the human and rodent plague problem.

In Madagascar, the incidence of human cases was relatively heavy until 1936; but since that time it has decreased. About 140 cases were reported in 1953, 20 cases in 1954, and 15 cases in 1955.

Africa, like Asia, has seen a decrease in the number of cases of human plague in the present century. Scientific study has revealed a wide involvement of wild rodents in Africa, but further ecological work will be needed to make possible a complete understanding of the epidemiology of plague in many parts of this continent.

Europe

One locality in Italy, one in Corsica, Malta, and the Azores Islands have been the scenes of the rare appearances of plague in Europe in recent years. No data are available concerning the rural enzootic focus of the lower Volga, which flared up during the German invasion of Russia in 1942.

No cases of plague have been reported in Europe since 1949.

Americas

In the United States, no evidence of human plague due to commensal rodents has been reported for the last thirty years, but it is now known through extensive studies that infection in wild rodents (mainly ground squirrels) extends over 15 of the western states. This enzootic infection sometimes reaches the human population and is the cause of the occasional human case of recent years. Canada knows plague only as an infection discovered in wild rodents in the provinces of Alberta and Saskatchewan.

South America experienced human plague early in this century, ultimately involving a large number of the seaports, as well as many other communities. The infection persisted, for example, in Ecuador, Peru, central and northern Argentina, Bolivia, the eastern part of Brazil, and Venezuela. There is now strong evidence that, as in Asia and Africa, true enzootic foci exist in some areas of these South American countries.

In the last ten years (1946-55), the reported cases of human plague have been as follows: [8]

	Cases
Argentina	30
Bolivia	143
Brazil	1080
Ecuador	410
Peru	748
Venezuela	23

These figures represent, in most instances, a significant decrease as compared with the earlier years of the century.

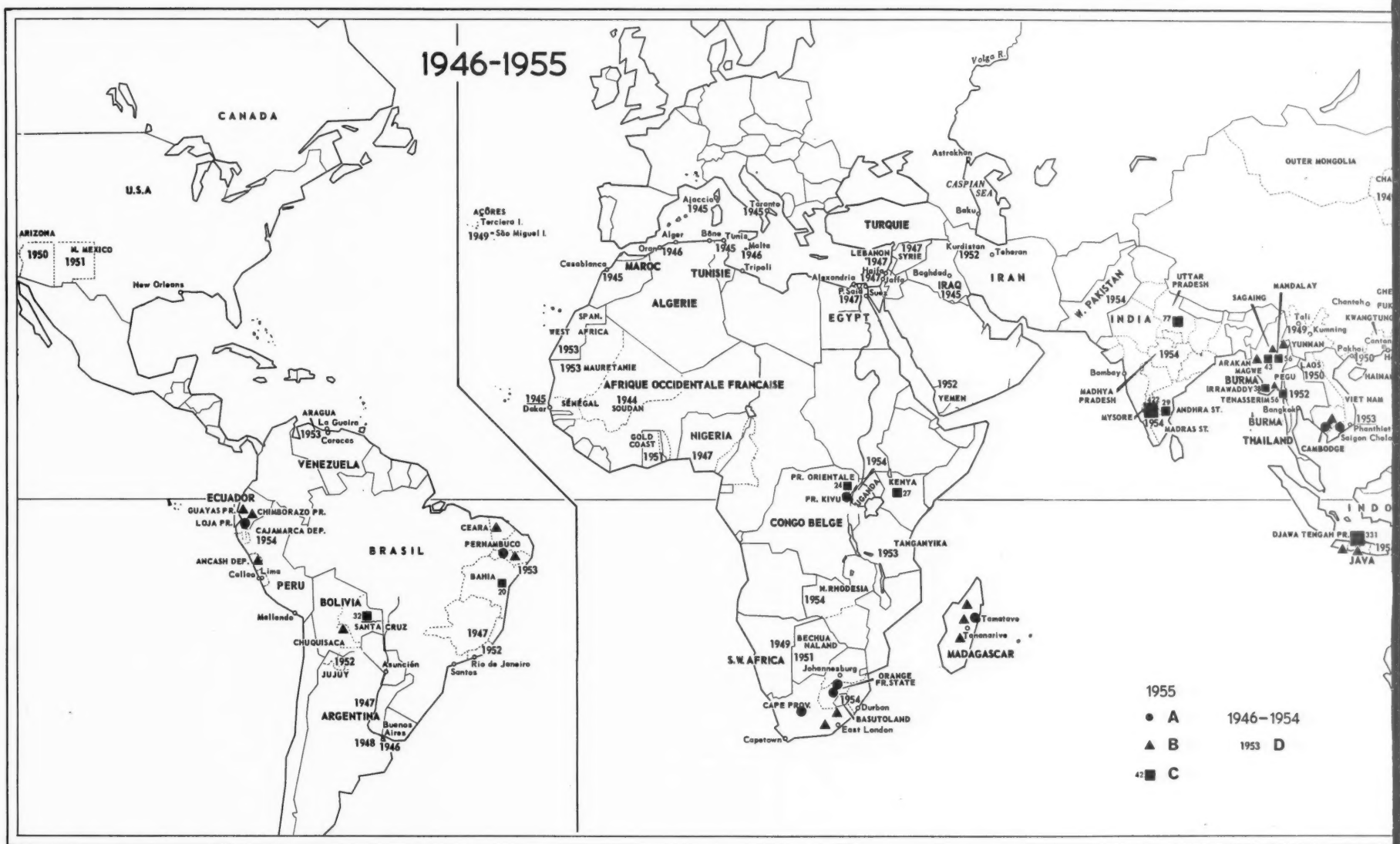
* * *

This very general review of plague is encouraging, especially since international transmission during the last few years seems to have ceased. (Only one such instance has been reported in recent years.) The disease in its human form has declined most significantly, particularly in the continent in which it previously had truly devastating effects—Asia. General sanitary and environmental improvements, better transport, and more efficient health services have all contributed to this decline. At the same time, new insecticides and rodenticides have reduced the threat from rodents. Another heartening advance lies in the new therapeutics. Even pneumonic plague, an invariably fatal type in former times, is now curable.

But, however dramatic and satisfying this progress may be, it is only part of the story. Plague is an animal infection, occasionally "spilling over" to humans. Wild-rodent plague—its extent, behaviour, and relationship to human plague—is but imperfectly known in most regions. As more information becomes available, it is possible that ecological pictures very different from those

[8] Based partly (1946-50) on data received by WHO, Geneva, and partly (1951-55) on figures in: Pan American Sanitary Bureau; Regional Office of the World Health Organization (1956) *Annual report of the Director, 1955*, Washington, D.C. (Official Documente, Nos. 16), p. 59

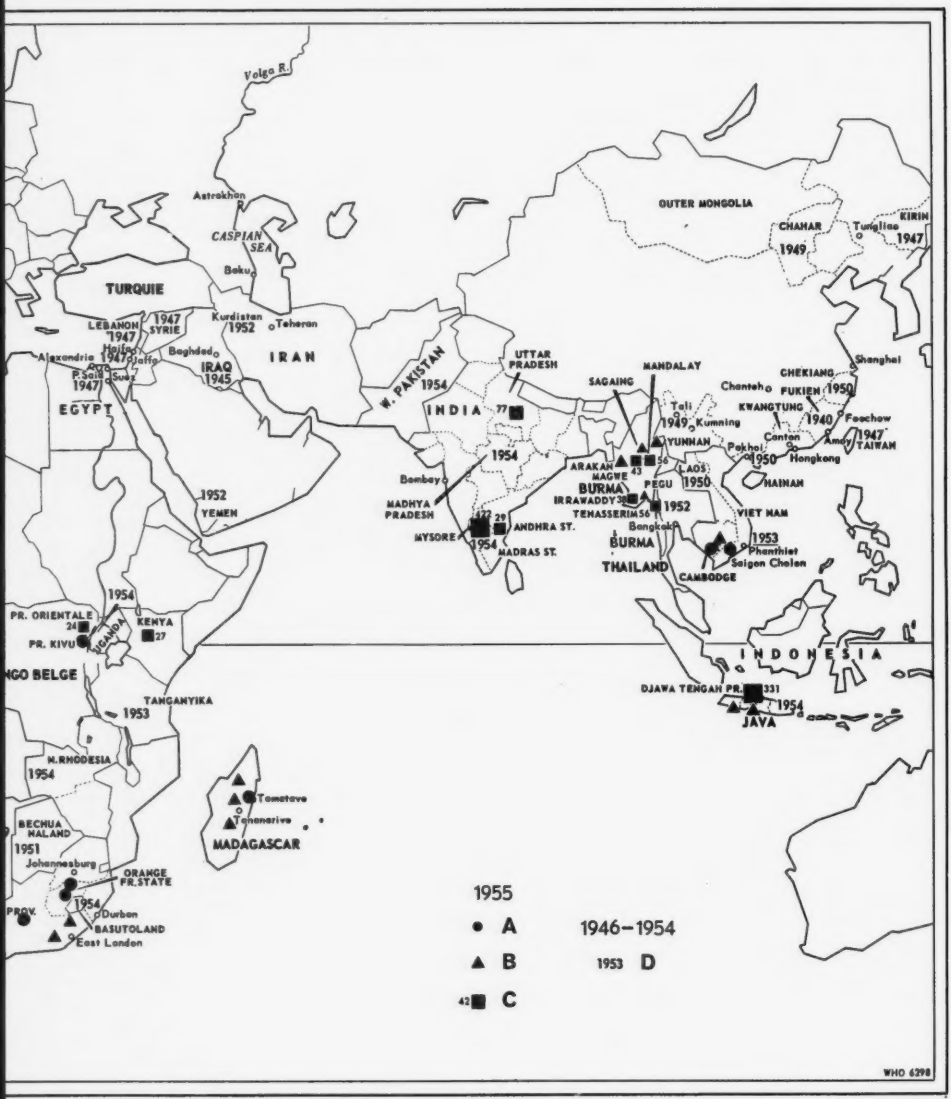
MAP 2. PLAGUE: DISTRIBUTION IN 1955 AND DATES OF LAST OCCURRENCE DURING PERIOD 1946-1954



1955: Officially reported cases
A = *1 case*
B = *2-19 cases*
C = *20 or more cases*

1946-1954:
D = *date of last occurrence of plague during period 1946-1954*

F LAST OCCURRENCE DURING PERIOD 1946-1954



D = *date of l ast occurrence of plague during period 1946-1954*

of today, when local infection is so frequently explained in terms of geographical invasions and importations, will emerge.

TYPHUS (Louse-borne)

Typhus is another disease in which scientific control in recent years has greatly changed the outlook. The calamitous record of centuries of typhus as a companion of war, famine, and other social disasters led to apprehension during the Second World War. However, in spite of the great social disorders, affecting whole countries during the latter years of the conflict, typhus never got out of hand. The outbreaks did not disorganize whole communities, though there were serious ones in north Africa, Yugoslavia, and Korea. (The situation in several east European countries and contiguous areas in Asia at the time is not fully known.)

Typhus was less of a menace during and after the Second World War not because the virus was less virulent or because conditions were initially unfavourable for the louse, but because it was controlled by the general sanitary measures enforced by armies and civil authorities; by the introduction of anti-louse dusting techniques, which became especially effective with the advent of DDT; and by the possible protection afforded by anti-typhus vaccination.

During and immediately following the war, there were foci of typhus in:

(1) North Africa—Algeria, Morocco, Tunisia, and Egypt;

(2) Eastern Mediterranean area—Iran, Iraq, Syria, and Turkey;

(3) Europe—Poland, Yugoslavia, Romania, Hungary, Bulgaria, Greece, and, later, Italy and prisoners' camps in Germany;

(4) South Africa;

(5) Korea and Japan;

(6) Central and South America—Chile, Guatemala, Mexico, and Peru.

Present position

Table II shows certain changes which have occurred in the last few years. Typhus is disappearing from Europe. The incidence in Africa, both in the north and in the south, with one exception, is definitely falling; the exception is Ethiopia, where a large number of cases were reported during the period 1951-55. Until 1953 some of the countries of Central and South America were still recording significant numbers of cases. In the Pacific region, the only serious outbreak in recent years was in Korea, and this was the result of war conditions. The position in other countries of Asia and in eastern Europe is uncertain.

The direct methods of typhus control available today are so simple and effective that the disease is not feared by even the most rudimentary health organization. The application of a residual insecticide (usually DDT), by means of a " gun ", to the clothing of individuals enables large groups of people to be rapidly deloused. This method was evolved in Egypt and north Africa [9, 10] during the Second World War, and continues to be the best means of controlling and preventing the spread of typhus and other louse-borne diseases. Further, public and personal cleanliness, which are improving in most countries, restrict these diseases.

Typhus and international travel

Since the Second World War, no outbreak of typhus is known to have originated from infection transported by international traffic. Only five infected ships have been reported to WHO: one, a ship arriving in Colombo (Ceylon), and the others, ships calling at Japanese ports.

Under peace-time conditions, and even during the social upheaval of war, typhus is

[9] Gear, H. S. (1945) *S. Afr. med. J.*, **19**, 290

[10] Soper, F. L. et al. (1943) *Arch. Inst. Pasteur Algér.*, **23-24**, 183

TABLE II. CASES OF, AND DEATHS FROM, LOUSE-BORNE TYPHUS REPORTED IN CERTAIN COUNTRIES FOR THE PERIODS 1946-50 AND 1951-55

		1946-50	1951-55
Algeria	C	1 818	293
Basutoland	C	99	5
* Belgian Congo	C	1 324	776
	D	17	16
Egypt	C	2 331	604
	D	530	48
* Eritrea	C	2 374	56
	D	248	0
Ethiopia	C	—	8 679
	D	—	162
Libya	C	1 086	461
Morocco (Fr. Prot.)	C	4 001	29
Morocco (Span. Prot.)	C	131 [a]	34
* Nigeria	C	109 [a]	21
* Ruanda Urundi	C	—	752
	D	—	14
Tangiers	C	103	4
Tunisia	C	1 966	154
Union of South Africa	C	2 643	335
	D	142	31
* Zanzibar	C	7	13
Bolivia	C	—	981
	D	—	148
Chile	C	3 600	1 322
	D	196	79
Colombia	C	—	5 979
	D	—	2 784 [d]
Ecuador	C	1 754 [a]	2 180
	D	—	90 [d]
Guatemala	C	1 476	92
	D	284	46
Mexico	C	9 093	4 291
	D	5 494	2 390 [d]
Peru	C	8 231	2 155
	D	6 842	2 343 [e]
* Venezuela	C	862 [a]	259
	D	70 [a]	31
Afghanistan	C	—	1 492
Iran (towns)	C	1 319	443
	D	111	7
Iraq	C	729	228
	D	—	7
Japan	C	5 771	5
	D	2 372	3
Jordan	C	192	74
	D	16	2
Korea	C	4 866 [b]	33 975
	D	298 [b]	6 268
Syria	C	227	9
Viet Nam	C	37	66
Bulgaria	C	3 681 [b]	—
	D	297 [b]	—
France	C	37 [c]	10
	D	33 [c]	—
Greece	C	309	21
	D	5	2
Hungary	C	2 206 [a]	—
	D	225 [a]	—
Ireland	C	1	0
Italy	C	73	0
Netherlands	C	3	0
Poland	C	4 816 [a]	—
Portugal	C	172	54
	D	31	10
Romania	C	70 074 [b]	—
Spain	C	349 [a]	63
Turkey	C	2 989	452
	D	216	32
United Kingdom	C	10	6
Yugoslavia	C	4 901	2 218
	D	396	89

* type not specified C = cases D = deaths — = data not available
[a] four-year period [b] three-year period [c] mostly prisoners liberated from camps in Germany [d] 1951-54 [e] 1951-52

DDT dusting of Peruvian Indians for typhus control

now of diminishing importance. No community respecting cleanliness and providing itself with the simple and inexpensive organization and apparatus required for dealing with the louse is now likely to fear importation of typhus.

RELAPSING FEVER

Louse-borne relapsing fever is probably the least well known of the quarantinable diseases. It was ignored in earlier international quarantine conventions but, in spite of its somewhat limited relationship with travel, was included in the International Sanitary Regulations in 1951.

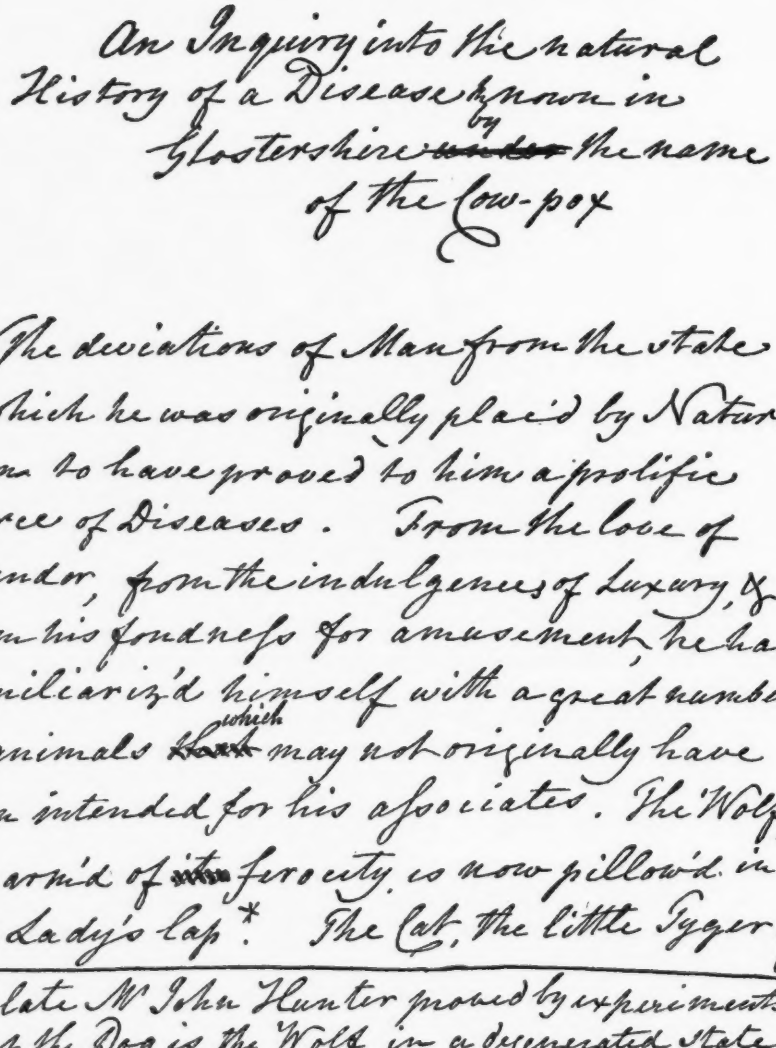
During the last forty years or so, the disease has been known to be present, in either sporadic or epidemic form, in east Europe, the USSR, China, India, and countries of northwest Asia and north Africa. In Africa, in Spain and other Mediterranean countries of Europe, and in north-west Asia, the coexistence of the tick-borne form of the disease often makes the differential diagnosis of sporadic cases difficult without a laboratory test.

In Europe, the last major outbreak of relapsing fever, which had been intermittently endemic in many parts of the continent, came in the years immediately following the First World War, and affected Russia, Poland, and Romania. Between the two World Wars, the disease appeared in the French Sudan and spread to adjacent territories.[11, 12]

Apart from a small epidemic early in 1945 among French troops in southern France (caused by infection imported from north Africa), the existence of louse-borne relapsing fever was reported in Europe only in Romania and Poland during the Second World War. (There are no data for the USSR, however.) In both Romania and Poland the

[11] *L.o.N. Monthly epidem. Rep.*, 1930, 9, 481

[12] Stuart, G. (1945) *UNRRA epidem. Inform. Bull.*, 1, 453



An Inquiry into the natural History of a Disease known in Glostershire by the name of the Cow-pox

The deviations of Man from the state in which he was originally placed by Nature seem to have proved to him a prolific source of Diseases. From the love of splendor, from the indulgences of Luxury, & from his fondness for amusement, he has familiariz'd himself with a great number of animals which may not originally have been intended for his associates. The Wolf, disarm'd of its ferocity, is now pillow'd in the Lady's lap*. The Cat, the little Tyger of

* The late Mr John Hunter proved by experiments that the Dog is the Wolf in a degenerated state

Facsimile of the first folio of the manuscript of Edward Jenner's original paper proposing the introduction of vaccination, presented in 1797. This proposal was rejected by the Council of the Royal Society.

(By courtesy of H. K. Lewis, London. In: Crookshank, E. M. (1889) *History and pathology of vaccination*, Vol. 1)

outbreaks were of limited extent and insignificant in comparison with epidemics of several other diseases. A severe epidemic was reported in north Africa in 1943-45.[13]

Present position

During the last five years, relapsing fever, never a serious problem in international travel, has been on the decline.

Europe has been free from the disease since 1949. In western Asia only sporadic cases have been reported; in 1955, for example, there were 27 cases in Iran, 1 in Iraq, and 3 in Afghanistan. In the western Pacific area, sporadic cases have been observed in Viet Nam and Cambodia; in the latter country, however, an epidemic of 4261 cases was reported in 1950. In Korea there were 2738 cases, with 246 deaths, in 1951; but only 25 cases were reported in 1953. In north Africa there have been, for the most part, only isolated cases. In 1955 some cases were reported in Eritrea and Somaliland. The only country with any significant recent outbreak has been Ethiopia, where there were 7320 cases in 1953, 5387 in 1954, and 2939 in 1955.

Louse-borne relapsing fever has been endemic in north African territories; in Eritrea, Ethiopia, and Somaliland; and in certain Asian territories, including Afghanistan, Iraq, Iran, Korea, and Indochina.

No known transmission of this disease by international travel has been reported in recent years.

Relapsing fever is today of little significance in international quarantine. Its epidemiology, the development of good public health services in the countries where it is endemic, and modern insecticides have all contributed to its diminishing importance. This is not to deny, however, that the tick-borne variety is still an internal problem in a few territories which have not yet been able to raise their sanitary standards.

SMALLPOX

All epochs, regions, climates, and peoples have known smallpox; it is the disease to which all have been subject. History, even up to very recent times, tells the sad story of its destructive effects among unvaccinated peoples. While vaccination has changed the course of the disease in many lands, other countries still continue to harbour it.

WHO has made three general studies of the recent incidence of smallpox.

In the eight years, 1940-47, covered by the first of these studies,[14] there was no serious pandemic, though it is to be admitted that data for this period are incomplete and variable. The lack of recorded pandemics is particularly noteworthy because these were war years.

Europe was free from the disease except for a few very localized outbreaks, due largely to importations into Italy, France, Greece, Spain, and Portugal.

In Asia, the sub-continent of India continued to be one of the persistent endemic foci, with the greatest incidence and mortality. There were also foci in Burma, Thailand, China, and Indochina, and outbreaks of the disease in Lebanon, Syria, Iraq, and Turkey.

Smallpox infection persisted, too, in most of north, central, west, and south Africa, though the exact significance of major and minor variola in the incidence could not be told.

North America was free from smallpox; but there were outbreaks of the disease and even endemic foci in countries such as Mexico, Peru, and Bolivia, and manifestations of the minor form in several other countries.

The second study [15] brought the record up to 1950 for most countries and to 1951 for others; figures were lacking for the inactive WHO Member States, however.

[13] Gaud, M. & Morgan, M. T. (1947/48) *Bull. Wld Hlth Org.*, 1, 69
[14] Fabre, J. (1948) *Epidem. vital Statist. Rep.*, 1, 268
[15] Murray, L. H. (1951) *Epidem. vital Statist. Rep.*, 4, 398

This review showed that Europe continued to be free from the infection apart from Portugal.

There was an improvement in the situation in Asia, but the significance of this continent as the main endemic home of smallpox was confirmed. Afghanistan, India, Indochina, and Pakistan continued to be endemic areas. Ceylon experienced repeated outbreaks of the disease through importations. No information on China was available. Japan was able to reduce incidence to negligible numbers by 1951. Though outbreaks of smallpox had occurred in the countries of the eastern Mediterranean region in the years 1940 to 1948, by 1950 and 1951 the incidence of the infection had decreased to the point where these countries were practically free from the disease. In summing up the situation in Asia, this review stated:

> Asia must therefore be regarded as the continent from which the greater proportion of importations to other countries arise. There are many large land areas where the disease is endemic, and epidemics are of frequent occurrence. Although several countries in this continent have proved that they are able, under existing circumstances, to maintain themselves free from the disease, the majority of the land area is infected with smallpox.

In Africa a high incidence of smallpox was reported for this period in French West Africa, the Gold Coast, Nigeria, and the Belgian Congo; serious forms of the disease were undoubtedly present. Milder forms were prevalent in eastern and southern Africa, but there were also cases of variola major. An encouraging feature in Africa was the absence of infection from the seaports and most of the major cities. Nevertheless, certain parts of Africa continued to show endemic foci.

The Americas repeated the story of the previous study. There were, again, only sporadic cases in the north, due to infection imported into the United States. The Central and South American countries showed the same incidence as before: there were endemic foci of variola minor in Mexico and most of the southern countries, though a downward trend was evident in many of them.

Oceania (comprising Australia, New Zealand, New Guinea, and the South Pacific islands) had no endemic smallpox and less than a score of cases ascribable to importation during the ten years covered by this particular review.

The third study [16] is of special interest in that it applies a scale of endemicity to the returns, admittedly of variable value, for the 15 years 1936-50. The index was obtained by averaging the smallpox attack or death rates for the years during this period in which the lowest incidence was recorded. It was then inferred that a high endemic index meant a relatively high level of smallpox in that country.

This study amply confirmed the presence of the highest endemic level in India, Pakistan, Burma, and Indochina. In the Americas, relatively high endemic rates were calculated for Venezuela, Brazil, Colombia, Bolivia, Peru, Paraguay, and Mexico. In Africa, the Belgian Congo, Nigeria, Tanganyika, and the Union of South Africa recorded high rates. (It should be noted that, in these American and African countries, interpretation is confused because of the high incidence of minor forms.) Only Portugal had a high incidence of the disease in Europe. (It may be noted here that Portugal became free of smallpox by the end of 1953.)

It is a matter of some statistical interest that returns received from most countries are still far from satisfactory, even though smallpox is a disease with less than the usual difficulties of diagnosis, notification, etc. For example, the differentiation of major and minor forms is only rarely possible in the returns received. Despite these statistical limitations, however, the three studies are a useful index to those countries in which smallpox is still of significance.

[16] *Epidem. vital Statist. Rep.*, 1953, **6**, 227

Present position

The most recent, available, provisional figures for cases are encouraging, as Table III indicates.

TABLE III. AVERAGE ANNUAL NUMBER OF SMALLPOX CASES NOTIFIED DURING THE PERIODS 1946-50 AND 1951-55

	1946-50	1951-55
Africa, total	**33 000**	**25 000**
Algeria, Egypt, Libya, Morocco, and Tunisia	2 200	80
Americas, total	**20 000**	**9 000**
Alaska, Canada, USA	132	9
Asia, total [a]	**139 000**	**144 000**
India and Pakistan	100 000	104 000
Korea	7 000	10 000
Europe, total [b]	**687**	**119**
Greece, Italy, Portugal, Spain	625	26
Approximate total	**193 000**	**178 000**

[a] Excluding China and USSR

[b] Excluding Albania, Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and USSR

The decrease in incidence has been most noticeable in America and, to a lesser extent, in Africa. The distribution of the disease during the last five years (1951-55), as ascertained by officially notified cases (including provisional figures for 1955), can be summarized as follows :

Some 890 000 cases were reported by 96 countries or territories having an aggregate population of about 1550 million. About 58% of all cases were reported in India and Pakistan, which account for 28% of the total population, while 23% of the cases were notified in other countries of Asia (outside China and the USSR) which have 21% of the total population. Thus countries of Asia (not counting China and the USSR) which account for about half of the world's population were responsible for more than four-fifths of all reported cases.

About 14% of all cases were recorded in Africa south of the Sahara, the population of which represents 10% of the total, and about 5% were in America south of the United States, which also accounts for 10% of the global population.

The countries which can now be regarded as free from the infection include: Oceania —Australia, New Zealand, and the South Pacific islands; Asia—the Eastern Mediterranean countries, Japan, the Philippines, and the Federation of Malaya; Africa—Egypt, the southern coastal areas, and the islands of the Indian Ocean; nearly all of Europe; and the Americas—North America, Mexico (since the end of 1951), and the Caribbean islands.

Infection has continued to show itself, apart from the major endemic zones of India and Pakistan, in Afghanistan, Burma, Iran, Iraq, Thailand, Laos, Indonesia, and certain parts of tropical and sub-tropical Africa and of the Americas. The position in the areas of the inactive Members of WHO, including the mainland of China, has been unknown.

Details of the present position are given below.

Asia

The Indian sub-continent (India and Pakistan) is at present the principal endemic reservoir of variola major, with high mortality. Vaccination and previous attacks have not yet built up a sufficient proportiou of protected population, especially in the densely populated areas.

The number of reported cases in India and Pakistan decreased in 1952 to about 88 000, and in 1953 fell below 42 000 (the lowest annual total on record); in 1954 it was about 49 000. The favourable situation during the last two years was due mainly to low incidence in the traditional endemic

areas, including Bengal (East and West), Bihar, and Orissa; the number of cases was comparatively higher west and south-west of this area.

The seasonal fluctuations follow a well-known and regular pattern: the highest level is reached in March and April, and the low level in October, when the disease is absent from many districts. It is in the period December to May, therefore, that smallpox is seen aboard ships in the Indian Ocean, because of a high incidence of the disease in Calcutta, Madras, Bombay, and other ports of India and East Pakistan.

In Burma the disease is usually most prevalent in the coastal area and the lower Irrawaddy valley.

In Thailand, as in Burma, infection is frequently re-introduced into the country by sea traffic rather than by land routes. East of Thailand, the continuous presence of smallpox is reported in Cambodia and in the northern and southern delta areas of Viet Nam; only occasional foci are noted in central Viet Nam and in Laos.

South of Thailand, Singapore and the Federation of Malaya have been practically free from smallpox since 1949. The situation is less favourable in the archipelago of Indonesia, where 52 228 cases were notified in 1950 and 101 375 in 1951. The number of cases has decreased considerably in more recent years; but, while only 1388 cases were officially reported in 1955, the infection was still present in Java, Sumatra, Borneo, and the Celebes.

Except for a few sporadic cases in Taiwan (9 in 1954, for example), and in the Shikoku island of Japan, the islands of the western Pacific area north of the equator are now free from smallpox. The position in China is not known.

In west Asian countries, there has been infection in Afghanistan, Iran, and Iraq. Since 1951 Syria, Lebanon, Israel, and Jordan have been practically free from smallpox.

Africa

In recent years there has been improvement in the prevalence of smallpox in Africa. North African countries and the Sudan have reported few cases since 1948, but in west Africa (French West Africa, Nigeria) the incidence has still been heavy. In east and southern Africa, even taking into consideration the appearance of the milder forms, smallpox incidence has decreased markedly in the last three years. In 1955 only sporadic cases occurred in Mozambique, Southern Rhodesia, Bechuanaland, and the Union of South Africa.

Americas

In the United States, where "classical" smallpox is absent and where the diagnosis of cases made mild by vaccination is difficult, only 4 of 27 suspected cases reported in 1953 were retained; and of these, the diagnosis in 3 cases was not supported by clinical and epidemiological findings.

Smallpox has been practically eradicated from Mexico,[17] where 27 cases were reported in 1951 and none from 1952 to 1955. However, 31 deaths were still ascribed to smallpox in the mortality data for 1952. Efforts are now being made to improve the diagnosis of suspected cases, especially among patients with chickenpox or varioloid.

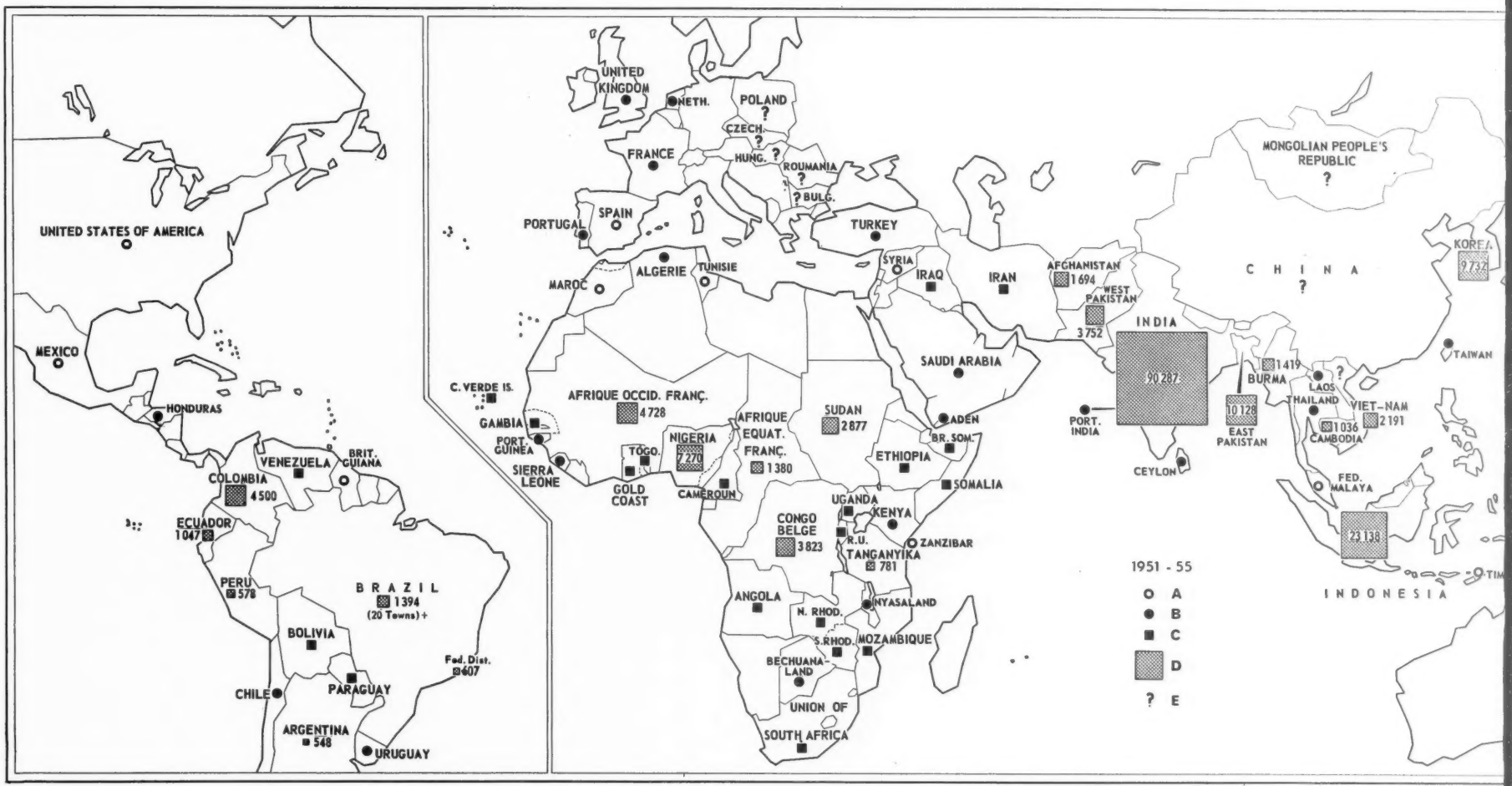
In Central America, Costa Rica, El Salvador, Panama, and the Canal Zone are free from the disease; but some reported deaths are still ascribed to smallpox in Honduras and Guatemala.

Compulsory vaccination is now applied by local authorities in Colombia. In 1953, 5526 cases were notified, 408 of them being fatal; in 1955, 2985 cases were reported.

A four-year, nation-wide, vaccination programme initiated in 1949 in Venezuela has

[17] Pan American Sanitary Bureau; Regional Office of the World Health Organization (1956) *Annual report of Director, 1955* Washington, D.C. (Official Documents, No. 16), p. 49

MAP 3. SMALLPOX, 1951-1955: ANNUAL AVERAGE OF OFFICIALLY REPORTED CASES, BY COUNTRIES AND TERRITORIES



A = *1-9 cases*
B = *10-99 cases*
C = *100-499 cases*
D = *500 or more cases*
E = *data not available*

LLY REPORTED CASES, BY COUNTRIES AND TERRITORIES

contributed to a considerable decrease in the incidence of smallpox in that country. There were two cases in 1955.

In Ecuador, the disease is still endemic. Some 1200 cases were reported in 1955.

Smallpox of the severe type has been known to be endemic in Peru. As a result of a campaign initiated in 1950, about 45% of the population have been vaccinated. The number of officially reported cases fell from 1360 in 1952 to 136 in 1954; no cases were recorded in 1955.

Variola major is still present in Bolivia.

In Chile the last epidemic, in 1950, accounted for 3564 cases. During that year almost the entire population was vaccinated. Only 7 mild cases were reported in 1953, and none in 1954 and 1955.

In the eastern part of South America, Brazil is still the main endemic area. In the Federal District and 20 state capitals for which data are available, the number of cases was 935 in 1954 and about 1100 in 1955. In Paraguay, 29 cases were officially reported in 1955.

In Uruguay, vaccination is compulsory, and the country is practically free from smallpox.

In Argentina, the disease appears to be generally of a mild type. It is particularly common in the Andean provinces. In 1950, 4462 cases, with 46 deaths, were notified; but only 252 cases were reported in 1954 and 43 in 1955.

Smallpox and international travel

Smallpox remains the disease most frequently responsible for reports of infected ships. It should be noted, however, that precise figures of the relative incidence of mild and severe forms are not available; and it is probable that a number of cases reported as smallpox are not of the severe type or are perhaps not even smallpox. In fact, chickenpox and other skin eruptions are sometimes recorded as smallpox.

During the six years 1949-54, 100 ships were reported infected. These reports came from 40 ports—4 in Europe, 2 in north Africa, 1 in Australia, 1 in the Philippines, and the rest in Asia. In 41 instances the infected ships came from ports of India and Pakistan; 7 came from China, and 52 from other (mostly Asian) ports. Only rarely were the larger, inter-ocean ships implicated.

The secondary cases which have resulted from the rare entries of infection from ships or even rarer entries from aeroplanes into communities free from smallpox have given further evidence of the difficulties of diagnosis of modified smallpox.

While the danger of transmission of mild and atypical forms of the infection creates new problems for health administrations, the confining of the severe type to certain endemic areas of the globe marks a dramatic decrease in the importance of smallpox. The persistence of endemic foci is regrettable and requires vigilance to prevent the infection from spreading elsewhere; but smallpox is no longer the threat that it used to be to all countries, even so short a time ago as the beginning of the twentieth century.

YELLOW FEVER

A peculiarity of the epidemiology of yellow fever is its association with tropical Africa and America but its absence from other continental regions where climatic conditions seem to favour its appearance—Asia, in particular. Although yellow fever has, in the past, occasionally invaded Europe and North America, it has never spread to Asia. This is an epidemiological mystery and one of the major considerations in present international quarantine practice.

In the seventeenth, eighteenth, and nineteenth centuries, there were serious outbreaks of yellow fever in west Africa, the Caribbean, and Central America and adjacent countries. The disease was frequently the

cause of dramatic losses to ship companies and took a toll among newcomers to affected areas. Its spread was along shipping routes passing from west Africa and the tropical American zone to ports and neighbouring areas of south-western Europe and south-eastern United States. Occasional invasions of more northern regions also occurred.

The dramatic story of man's victories over yellow fever is well known. Medicine has few to equal it. Carlos J. Finlay proposed the theory of insect transmission; Reed and his associates of the U.S. Army Yellow Fever Commission proved the theory; and thus yellow fever lost the menace of the mysterious and was seen to be preventable. Thereafter, a fascinating series of research and administrative achievements followed.

The cause was found to be a virus which, in due course, was shown to have immunological affinities with a number of other viruses, including those causing dengue and some of the encephalitides. The vector was studied: *Aëdes aegypti* in the urban form of the disease and other species in the rural or jungle types found in America and Africa. Ecological and epidemiological work in both continents revealed the elements of a most complex and interesting group of problems, involving virus, man, primate and possibly marsupial alternate hosts, and mosquito, each in turn affected by many other factors. Environment, climate, habit, occupation, movement, natural and artificial forms of disease resistance, and many other known and probably unknown pieces were put together to outline the puzzle picture.

The story of yellow fever, absorbing though it is to the scientist, is equally satisfying to the administrator. The public health man has taken the scientific facts to guide him in campaigns of control and prevention which are among the finest in the whole history of medicine. It is the Americas which have developed the successful administrative means to wage effective campaigns against yellow fever. The governmental medical services of these countries, both individually and through their chosen intergovernmental body, the Pan American Sanitary Organization, with its Bureau, assisted by the Rockefeller Foundation, have perfected methods to control and then to eliminate the urban vector, *Aëdes aegypti*; to carry the attack against the disease into its enzootic jungle reservoirs; and to give man complete protection in the form of yellow fever vaccination.

These demonstrations of methods for dealing with a complicated medical problem on a continental scale are as praiseworthy and exemplary as are the scientific advances which are more usually recalled in this story. However, it is to the happy association of scientific knowledge and its effective application that the world owes the reduction to its present definable and restricted position of a disease which was once of frightening devastation and a great obstruction to the development of tropical areas.

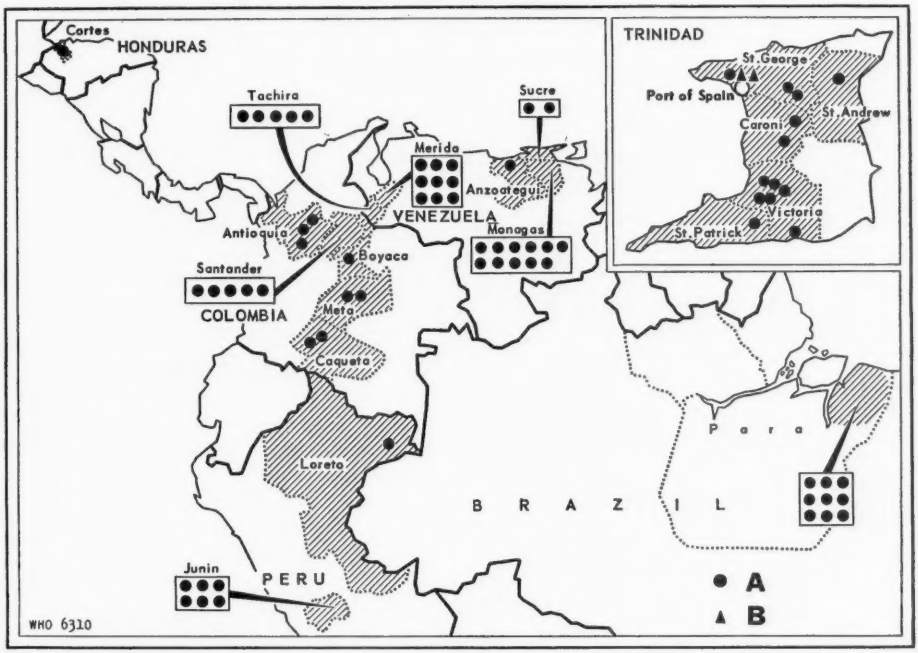
Present position

Americas

As has been noted, the comprehensive campaigns undertaken by health authorities in recent years have been among the most noteworthy achievements of modern preventive medicine. Scientific findings applied by efficiently organized medical services have produced the present favourable position. The *Aëdes aegypti*-borne form of yellow fever has not appeared in the Americas since 1934, with the exception of an outbreak on the island of Trinidad in 1954 in which there were three cases believed to be of this type.

Anti-mosquito programmes were begun in the early years of the present century, immediately after the role of the insect vector had been discovered. The character of these programmes changed from general

MAP 4. YELLOW FEVER IN THE AMERICAS, 1954: REPORTED CASES BY MAJOR DIVISIONS OF EACH COUNTRY *



A = *jungle yellow-fever*
B = *cases with no history of direct association with forests which occurred in* Aëdes aegypti-*infested areas*

* Source : Pan American Sanitary Bureau; Regional Office of the World Health Organization (1955) *Annual Report of the Director, 1954*, Washington, D.C. (Official Documents, No. 11), p. 35

mosquito control to eradication of the *Aëdes aegypti* species in an effort initiated by the Brazilian National Yellow Fever Service, aided by the Rockefeller Foundation. In 1947 the Directing Council of the Pan American Sanitary Organization endorsed, stimulated, and assisted action along this line for all of Central and South America.

This bold and comprehensive regional policy has transformed the yellow fever situation. The disease has disappeared from cities, towns, and other human habitations previously infested with *Aëdes aegypti*; but the hope that the eradication of this mosquito would eliminate the disease has not been realized. In 1933 a new type of yellow fever was recognized: jungle yellow fever, transmitted not by *Aëdes aegypti* but by other mosquitos.

The jungle yellow fever of the Americas results in human infection only incidentally: the associated species of mosquito and primate are such that contact with human habitation does not occur. It is the entry of man himself into the forest in which active jungle infection exists that may result in his infection. This is the form of yellow fever which has been recorded in the Americas recently. However, the complex of virus infection and primate immunity affected

MAP 5. YELLOW FEVER IN THE AMERICAS, 1955: REPORTED CASES BY MAJOR DIVISIONS OF EACH COUNTRY *

* Based on provisional reports

by a sylvan mosquito factor explains the inconstancy of local prevalence of the jungle form and its "spreading" behaviour. Epizootics spread across jungles possessing the virus, the vector, and the primate host. Certain dense jungle areas in the Amazon and Orinoco valleys, the Guianas, Venezuela, and Panama appear to be enzootic.

The officially reported incidence of human yellow fever in the Americas is shown in Table IV.

The most interesting recent events have been the extension of jungle yellow fever in the Central American countries, its appearance in 1954 in Trinidad, and its practical disappearance from Brazil (except in one area) in the same year.

In addition to the *Aëdes aegypti* eradication

TABLE IV. CASES OF, AND DEATHS FROM, YELLOW FEVER IN THE AMERICAS FOR THE PERIOD 1946-50 AND FROM 1951 TO 1955

Country or territory		Total 1946-50	1951	1952	1953	1954	1955	Total 1951-55
Bolivia	C	1842	3	1	18	2	4	28
	D		0	0	11	0	3	14
Brazil	C	14	46 *	223	39	9	8	325 *
British Guiana	C	2	0	0	0	0	0	0
Colombia	C	–	–	–	11	13	21	–
	D	215	24	16	11	13	18	82
Costa Rica	C	0	171	18	0	0	0	189
	D	0	43	13	0	0	0	56
Ecuador	C	19	42	0	0	0	0	42
	D	5	11	0	0	0	0	11
Honduras	C	0	0	0	0	1	0	1
	D	0	0	0	0	1	0	1
Nicaragua	C	0	0	6	8	0	0	14
Panama	C	6	1	1	0	0	0	2
	D	1	1	1	0	0	0	2
Peru	C	28	4	1	0	7	0	12
	D	–	4	1	0	7	0	12
Trinidad	C	0	0	0	0	15	0	15
	D	0	0	0	0	4	0	4
Venezuela	C	20	3	1	6	28	5	43

C = cases D = deaths – = data not available

* In Goias State, 100 cases and 20 deaths further reported in one area in 1950, and 2000-3000 cases and 400 deaths in 1951

programme, large-scale vaccination of rural populations is being undertaken in the Americas.

Africa

The epidemiological position of yellow fever in Africa differs from that in America. The *Aëdes aegypti* vector has a wider range in west Africa, for example, than it does in America: it is not so strictly limited to human habitation, with the practical consequence that its control, not to speak of its eradication, is not as simple. In addition, the available knowledge suggests that there is a jungle type of yellow fever probably more complex and with a different relationship with humans than that in the Americas. In Africa the mosquito-monkey complex is not confined so definitely to the forest canopy; the monkey goes marauding and, emerging from the true forest, can cause human infection in a village or habitation, through *Aëdes simpsoni* transmission.

The use of the mouse protection test has been extensive in Africa. It has shown positive reactions beyond areas with clear-cut human cases. However, the increasing number of persons being vaccinated against

yellow fever in many African countries is likely to make any immunity survey to determine previous infection more difficult.

The existence of yellow fever virus at some time or another in Africa, as determined mostly by the immunity serum test (mouse protection test), has been revealed in various localities of west, central, and east Africa, but not on the east coast or farther south than the northern part of Bechuanaland, where there were a few positive reactions. This area, especially in its southern and eastern extensions, is considerably larger than that from which known outbreaks of human yellow fever have been recorded. Such yellow fever has traditionally been associated with the west coast. In fact, an outbreak in 1940 in the Nuba Mountains region and a few isolated cases in central and east-central Africa in the Congo forest area are the only other definite manifestations of the infection. Outside the west African territories, with the Gold Coast and Nigeria as the main centres, human yellow fever infection in Africa has therefore not produced repeated, recognizable, clinical conditions.

In Africa, as in the Americas, yellow fever in man thus shows two forms: first, a true man-to-man infection conveyed by *Aëdes aegypti*, and, secondly, a chance human occurrence of a disease primarily affecting monkeys. Both the urban and sylvan forms of the disease differ in many ways from those of America because of different mosquito vectors and primate (and possibly other) hosts.

The recorded human cases in Africa are shown below:

Country or territory	*Total 1946-50*	*1951*	*1952*	*1953*	*1954*	*1955*	*Total 1951-55*
French West Africa	6	2	1	2	0	0	5
Sierra Leone	4	0	0	0	0	2	2
Gold Coast	49	25	6	1	2	7	41
Nigeria	50	13*	42*	16	2	1	74*
French Equatorial Africa	5	0	0	0	0	1	1
Belgian Congo	8	0	5	8	1	3	17
Uganda	0	0	1	0	0	0	1

* Another source (Nigeria, Department of Medical Services (1954) *Annual report on the Medical Services for the year 1951-52*. Lagos, p. 16) reports, in addition, 5500 cases and 600 deaths in Udi Division, Onitsha Province, Eastern Region, from October 1951 to January 1952.

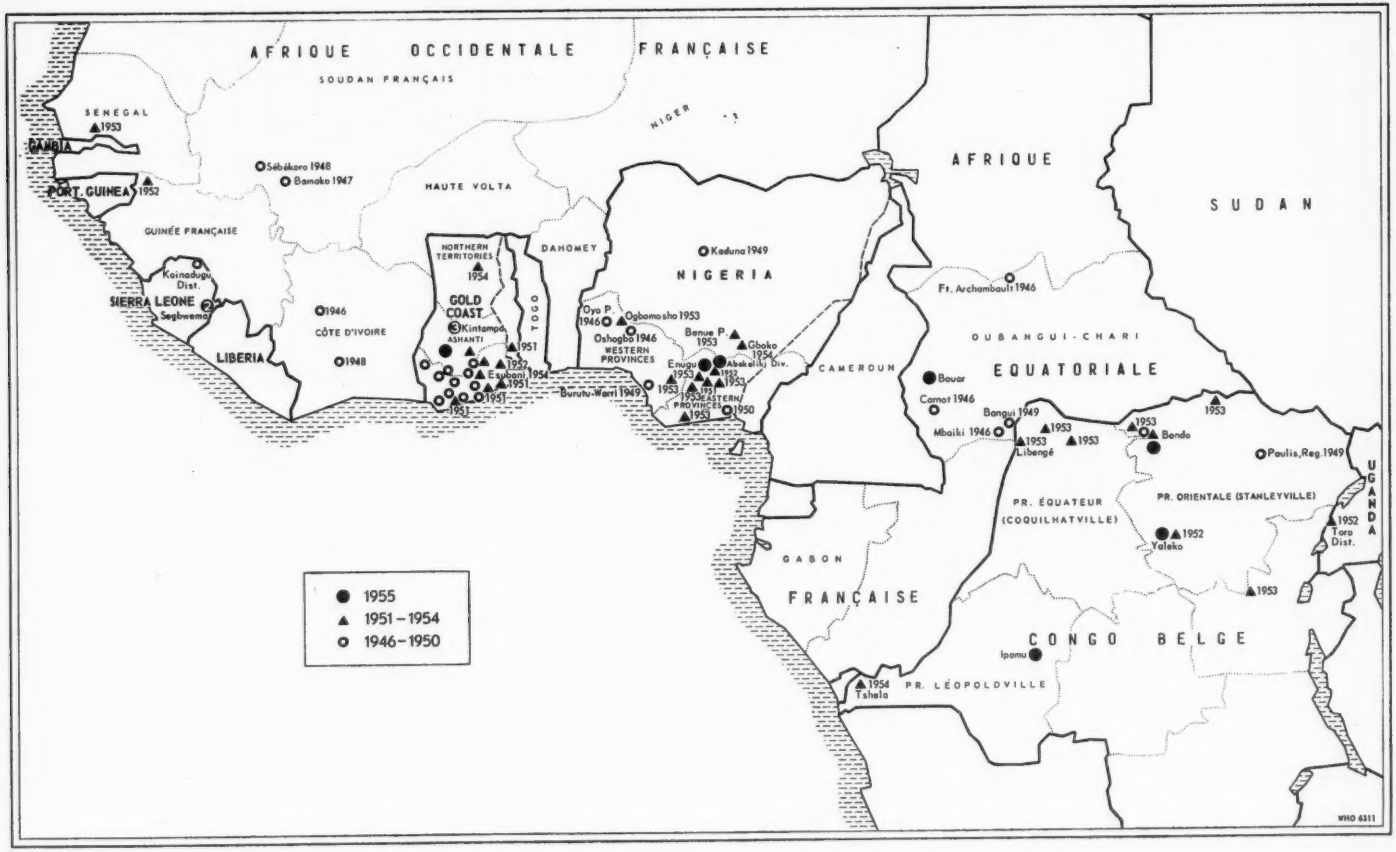
Yellow-fever receptive areas

The expression "yellow-fever receptive areas", as used in the present International Sanitary Regulations, indicates areas where the infection, if introduced, could develop. The tropics and sub-tropics, with only a few limited exceptions, harbour *Aëdes aegypti*; and their populations are consequently regarded as being susceptible to yellow fever if the virus were to gain admission. Since the vector is also found both north and south of the tropical zones, especially in warm seasons, the area of the world exposed to *Aëdes aegypti*-transmitted yellow fever is vast. However, for practical purposes, it is the tropics and sub-tropics which must be considered, since here both the vector mosquito and the temperature range are suitable for the establishment of the virus in a man-mosquito cycle; and herein lies the principal fact determining the nature of international measures taken to reduce the chance of spread of the virus from its African and American foci.

The densely populated regions of south-east Asia and the western Pacific, where the situation is further complicated by the

MAP 6. YELLOW FEVER IN AFRICA, 1946-1955: AREAS IN WHICH CASES WERE REPORTED IN 1955 AND DURING THE PERIODS 1951-1954

MAP 6. YELLOW FEVER IN AFRICA, 1946-1955: AREAS IN WHICH CASES WERE REPORTED IN 1955 AND DURING THE PERIODS 1951-1954 AND 1946-1950



presence of local susceptible primates such as the rhesus monkey, are of special concern. The local mosquitos may be assumed to be potential vectors, the human and primate populations are susceptible, and ecological conditions are apparently suitable for the disease to take hold.

* * *

Although the devastating effects of yellow fever in earlier times, especially in the Caribbean area and west Africa, are remembered, its importance in the present century has diminished: knowledge of its etiology and epidemiology has led to its successful control over large areas where once it was feared. Furthermore, for many years no case of yellow fever has been reported in which its origin could be traced to international travel, by either sea or air.

Mosquito eradication campaigns and widespread vaccination have combined to restrict yellow fever in the Americas to the sylvan type in remote jungle areas. In Africa, because of epidemiological characteristics still not determined, the sylvan type is less dramatic, rarely being recognized clinically. Here, too, however, mass vaccination is being used to reduce the threat of both the urban and the sylvan forms of yellow fever.

Much of the ecology of the mosquito vectors and vertebrate hosts in their complex relationships undoubtedly remains unknown. In spite of this, however, human yellow fever has become manageable and its threat to receptive areas less fearsome.

CONCLUSIONS

The years since the Second World War have seen a dramatic decline in the extent and severity of the so-called " quarantinable " diseases—cholera, plague, typhus, relapsing fever, smallpox, and yellow fever. These diseases are now shadows of their former menace. Their endemic, original foci have dwindled; and the frequency and extent of their occasional excursions from these foci have diminished.

The reduction in the international spread of the quarantinable diseases may be attributed to a variety of factors : intensive laboratory and field research has revealed most, if not all, of their etiology and epidemiology; there are now specific preventive and therapeutic measures against most of them; finally, the improvement in general health conditions in most countries is making practically all communicable diseases more vulnerable to attack and less likely to gain a foothold even if they secure entry. Countries possessing well-organized community and health services now have little to fear from the importation of any quarantinable disease. Countries in which one or more of the quarantinable diseases are, unfortunately, still endemic, by the improvements they are making in their health and medical services will reduce the threat both to themselves and to their neighbours. Inter-ocean and inter-continental travel is, with few exceptions, now undertaken in ships and aircraft of such high standards of cleanliness and sanitation that the transmission of disease or its vectors is unlikely.

Fear of invasion by the quarantinable diseases and the consequent effects on international traffic are no longer necessarily among the chief preoccupations of national health administrations, which are well aware that modern epidemiology, public health, and general economic and social advancement of all communities are safeguards against cholera, plague, and other diseases which once were major threats. Gone are the days when ignorance and lack of means of prevention meant death, panic, and chaos to whole nations stricken by the quarantinable diseases.

THE GROWING IMPORTANCE OF INTERNATIONAL TRAVEL AND TRADE

The speed of modern travel and the increasing interdependence—politically, economically, and socially—of all countries have made the world one. Few communities, even on islands, today have any claim to isolation. The desire of people of all sorts to move freely about the world and the need for all countries to receive or export raw materials and manufactured goods are now irresistible forces. The mystery of unexplored territory no longer exists, but human restlessness is greater.

World movement of people and goods, of ships, aircraft, and all other kinds of transport is one of the most striking phenomena of modern civilization. It is growing rapidly, involving all communities and regions more and more inextricably. Indeed, international traffic cannot be denied its importance: it is one of the foundations of the economic development of the world as a whole and of almost every country individually. The growth of international sympathies and understanding, the diffusion of knowledge and culture, the facilitation of technical co-operation, assistance to migration, and even aid to simple tourism are important to every government; and all require that travel be simple and quick. International sanitary conventions must therefore be so designed as not to obstruct the movement of traffic unnecessarily.

TABLE I. VALUE OF IMPORTS AND EXPORTS IN U.S. DOLLARS *

Region	Imports c.i.f.		Exports f.o.b.	
	1948	1953	1948	1953
	$ millions		$ millions	
WORLD [1]	58 500	75 850	52 715	73 600
North America	10 900	16 860	15 740	19 900
Latin America dollar area	2 980	3 530	3 270	3 640
Latin America non-dollar area	3 390	3 050	3 490	3 530
Continental western Europe [2]	15 790	21 290	10 010	19 450
Overseas territories of continental western Europe	2 450	3 520	1 860	2 770
Sterling area countries	17 820	19 280	14 660	17 850
Other parts of Europe and dependencies	1 350	1 610	1 210	1 300
Middle East non-sterling area	1 520	1 720	1 650	1 600
Far East non-sterling area [3]	2 330	4 930	1 310	3 110
Rest of world [1]	65	60	35	45

* Compiled from Table 146, United Nations (1955) *Statistical Yearbook, 1955*, New York

[1] Excluding the trade of Albania, Bulgaria, China Mainland, Czechoslovakia, Eastern Germany, Hungary, North Korea, Poland, Romania, and the USSR

[2] Excluding Spain, Finland, and Yugoslavia

[3] Excluding China Mainland and North Korea

Some specific figures will give an idea of the extent and nature of modern travel, transport, and trade.

Table I shows the present scale of world trade and the significant participation of most regions in it.

The implications for shipping are indicated by the fact that merchant shipping tonnage increased from about 80 million gross registered tons in 1948 to about 97 million in 1954.

Aircraft are gaining in importance as transport carriers and rival shipping in international passenger travel. From the figures below it is seen that the number of international air passengers carried in 1954 was more than 10 million.

Year	*Number of passengers carried by international scheduled air services* [1]
1948	3 893 638
1950	5 998 435
1952	8 105 043
1954	10 636 307

It is also of interest that " from July to September [1954] overseas air carriers serving the United States carried approximately 50% more passengers to and from that country than travelled by sea... On the trans-Atlantic route, however, where airlines compete with the fastest and most luxurious surface liners, sea travel still exceeds air travel by a substantial margin. There, 938 000 passenger crossings were effected by sea, an increase of 5% over 1953, as against 581 000 carried by the scheduled airlines, an increase of 11%." [2]

Most countries today seek to attract another element of international travel—the tourist. Many owe much of their income to holiday makers from elsewhere and are doing everything poassible to increase it. The fact that more than one and a half million persons left the USA to go abroad in the year ending 30 June 1955 gives some indication of the scale of international travel.

The known facts about world travel and trade by sea and by air refer to the scheduled lines. It is these which now observe, on the whole, commendable standards of construction and management. Ill-ventilated, rat-harbouring, dirty, and over-crowded ships have almost disappeared. Most countries demand that ships registered with them be properly constructed and adequately maintained to protect the health of passengers and crew and to minimize the opportunities for disease or its vectors to appear. This is a factor which has helped to change the picture of some of the quarantinable diseases, such as plague and cholera. Scheduled aircraft, too, have to meet rigorous standards to ensure the safety and health of their passengers; today the airliner is not likely to be insanitary.

The recorded facts of world shipping and air transport are not the whole story. A vast movement of small vessels, many local to certain oceans, such as dhows and junks, also takes place. Furthermore, there is the passage across frontiers of trains, caravans, lorries, and individuals who do not figure in tables. Much of this localized international traffic and trade has lagged far behind the organized, well-known shipping and aircraft lines in improving sanitary and medical standards, and it is not possible or practical to submit such traffic to worthwhile sanitary control. Yet, if transmission of disease by travel is of moment, it is this large, amorphous, localized traffic which is most likely to be involved.

Points of departure and arrival, of embarkation and disembarkation, are another part of the complex of world traffic and spread of disease. Here, too, dramatic changes are taking place. The enormous traffic of today has demanded large, modern

[1] Compiled from : International Civil Aviation Organization, *Digest of Statistics*, Nos. 29, 46, and 54; Series T, Nos. 8, 11, and 12. These figures are for 127 airlines, from 44 countries. Data for the USSR, China Mainland, and eastern European countries are not included.

[2] International Civil Aviation Organization (1955) *Report of the Council to the Assembly on the Activities of the Organization in 1954*, Montreal (Document 7564, A9-P/2, 27/4/55), p. 4

Disinsectization of the interior of an aircraft by the stewardess

(By courtesy of the US Public Health Service)

ports and airports. The Port of New York, for example, handled over one million passengers entering the country in 1954; and, on an average, an aeroplane left the USA for a flight across the Pacific or the Atlantic about every half hour.

It is not only the so-called " big " powers that have a large volume of traffic and important stopping places. Indeed, the economic value and general usefulness of having international ports and airports within their territory is appreciated by all countries, and there is competition among them for recognition of their ports as stopping places for ships and aircraft.

The modern port is not the menace of its predecessor, though, unfortunately, some countries do not yet enforce desirable standards of sanitation, cleanliness, and freedom from disease. Most of the important, well-known ports are, however, no longer foci of plague, cholera, and typhus. Most countries recognize that it is important to their economy, prestige, and popularity that their ports be made more attractive and efficient. Increasing heed is being paid to the sections of the International Sanitary Regulations which concern ports and airports.

The long history of international sanitary legislation shows the earnest desire of health

authorities to avoid unnecessary obstruction of the movement of international traffic. Its importance to the developing economy of nations, to the distribution and improved variety of food and other essentials, to ease of scientific association, world trade, and travel, and, in general, to social and health advancement has been increasingly accepted. Fortunately, the steady extension by all States of their health and medical services has reduced both the occurrence of quarantinable diseases and the susceptibility of peoples to them; and the period of rigid application of restrictive quarantine measures is therefore passing. In its desire to stop the spread of the quarantinable diseases and, at the same time, to encourage factors aiding economy and well-being, medicine is able to harmonize its practice more and more with the legitimate rights of world traffic.

There is medical sympathy for the argument of travellers and traders that international traffic be freed from unnecessary complications. Such traffic is the subject of much regulation, demanding time and money; and many are the criticisms of frustrated people about the difficulties impeding travel and trade. For example, it has been said, "If Sir Francis Drake wished to circumnavigate the globe today he would not be allowed to do so. He would be stopped because he had no passport, arrested for taking money out of the country. If by any chance he managed to elude the port authorities he would certainly be detained . . . because he had not been vaccinated."[3] And an international airways official has been quoted as saying that, although a trip around the world by aircraft could be made in only five days at a cost of approximately $1350, it needed a minimum of six weeks to secure the documents required. Fees and charges for these papers came to about $150. Further, it is a well-known fact that holding up ships and aircraft directly costs large sums, besides inflicting harm and inconvenience on many people.

The United Nations is aware of the need to remove restrictions on travel. The subject has been considered many times by such bodies as the Economic and Social Council (ECOSOC), as has been pointed out in the *United Nations Review* :

> Charged with the task of promoting general world economic progress, the Council and its subsidiary bodies, such as the regional economic commissions for Europe, for Asia and the Far East and for Latin America and its Transport and Communications Commission, have discussed and studied various aspects of making travel abroad more easy. . . . Much of the work in recent years of the Economic and Social Council and some of its subsidiaries has been devoted to devising ways of simplifying frontier formalities.[4]

At its nineteenth session, in May 1955, the Economic and Social Council resolved that the Secretary-General should address a new inquiry to governments to secure official information on the progress achieved in simplifying passport and frontier formalities. The discussion related particularly to tourism, which is now so important that its "earnings . . . in 1953 totalled more than the value of world trade in wheat, according to figures compiled by the International Monetary Fund for forty-one countries".[4] ECOSOC has therefore asked "the organs of the United Nations and appropriate specialized agencies to give favourable consideration to constructive projects . . . designed to increase tourist facilities and to promote travel".[5]

Other international organizations are also concerned with world travel and its concomitants. The International Civil Aviation Organization (ICAO), for example, is eager to see travel made quicker and easier and conditions at airports more sanitary and healthy. This organization is now working

[3] *Brit. med. J.*, 1954, 2, 701

[4] *United Nations Review*, 1955, 1, No. 11, p. 46

[5] United Nations Economic and Social Council (1955) *Official Records of..., Nineteenth Session, Resolutions, Supplement No. 1*, New York (Document E/2730, 18 April 1955), p. 2

with WHO in efforts directed towards the sanitary improvement of airports. The International Union of Official Travel Organizations is following the progress of international traffic through its Study Commission on International Travel Statistics, which pointed out in 1953: "The world travel movement continues to grow rapidly. Year by year more countries enter the market but the demand stimulated by the development of new forms of transport and investment in travel facilities shows no sign of diminishing." [6]

[6] International Union of Official Travel Organisations, Research and Organisation Commission (1953) *International travel statistics, 1951 ; fifth report of the Study Commission of the International Union of Official Travel Organisations on International Travel Statistics*, London, p. 7

THE INTERNATIONAL SANITARY REGULATIONS (WHO Regulations No. 2)

International sanitary conventions up to, and including, those of 1944 had two definite purposes: to define measures which might reduce the international spread of disease, and, at the same time, to avoid unnecessarily obstructing trade and the movement of people across frontiers. Each of the many conventions had a specific objective; none, therefore, entirely replaced its predecessor or any other previous convention on the same subject. In the immediate post-war years 1945-46, when the idea of an international health conference under the aegis of the United Nations was taking shape, 13 conventions and similar agreements were simultaneously in force (see Annex 2, page 333). Diplomatically and technically, there was much confusion; and shipping and travel were exposed to many difficulties and delays.

PREPARATION AND ADOPTION

The Constitution of the World Health Organization, which was drafted in July 1946, specifically provided that the World Health Assembly should "have the authority to adopt regulations concerning . . . sanitary and quarantine requirements and other procedures designed to prevent the international spread of disease . . ." (Article 21). WHO was thus assigned the important task of trying to reach international agreement in a domain which was traditionally one of considerable controversy.

Preliminary studies were undertaken, during the period 1946-48, on the possibility of drawing up a single set of regulations, based on modern epidemiological concepts, to replace the previous sanitary conventions. A series of expert groups convened jointly by WHO and the Office International d'Hygiène Publique provided the necessary technical advice. Later, the First World Health Assembly set up the WHO Expert Committee on International Epidemiology and Quarantine, which was instructed "to revise the existing International Sanitary Conventions . . . and combine them into a single body of regulations covering the needs of all travellers".[1]

The new international sanitary regulations were to be based on a number of principles,[2] among which were the following:

1. Accurate and rapid notification of the appearance of disease should form the basis of effective measures against the international

[1] *Off. Rec. Wld Hlth Org.*, 1948, **13**, 306
[2] *Off. Rec. Wld Hlth Org.*, 1949, **19**, 7

spread of disease and of the withdrawal of restrictions on traffic once the danger of infection has passed.

2. Each country should develop its own internal protection against disease—through improvements in environmental sanitation, control of insect vectors, and country-wide immunization against certain diseases, for example—rather than rely on measures taken at its frontiers.

3. Measures taken at frontiers should be the minimum compatible with the existing sanitary situation. Excessive measures not only would unduly interfere with traffic and have severe economic consequences, but also, by their very excess, might lead to deliberate evasion of the sanitary control and thereby defeat their purpose.

The measures to be set forth in the WHO sanitary regulations were not to be exceeded by health administrations; they had therefore to represent the maximum applicable in exceptional as well as in normal circumstances.

With regard to certain technical legacies from previous conventions, the WHO Expert Committee on International Epidemiology and Quarantine decided that declarations of health for ships and aircraft [3] should be maintained; that the practice of demanding immunization certificates from travellers should be reconsidered, since many of the requirements which had developed since the Second World War were out of proportion to the protection which they afforded; that the system of bills of health [4] and consular visas on such bills should be abolished in view of the improvement in international epidemiological intelligence services; and that periodic sanitary inspection of ships should be retained in the WHO regulations and should cover not just a search for rats, but also sanitary inspection in general, with attention to insect infestation.

Once the Expert Committee had drafted the text of the new regulations, an elaborate machinery for clearance and approval came into action: the draft regulations were submitted to WHO Member States and to interested international agencies; subsequently, they were studied, together with the comments and suggestions received from governments and other interested bodies, by a special committee which had been established by the Third World Health Assembly and which met from 9 April to 15 May 1951. This committee—which became, at the Fourth World Health Assembly, the Committee on the International Sanitary Regulations—further considered, in meetings from 19 to 21 May 1951, the draft text of the regulations and prepared the necessary resolutions for the Health Assembly. This thorough preparation resulted in the unanimous adoption of the International Sanitary Regulations (WHO Regulations No. 2) by the Fourth World Health Assembly on 25 May 1951.

PROCEDURE AND ACTION RELATIVE TO ACCEPTANCE, RESERVATIONS, AND REJECTIONS

The International Sanitary Regulations are of legal as well as technical interest in that they represent a new type of international agreement. The WHO Constitution gives the World Health Assembly the direct power to discuss and adopt international health regulations; equally important, it provides that no positive act be required for acceptance by a Member State desiring to become a party to such regulations. In other words, if the Health Assembly, which consists of representatives of all the States Members of WHO and which meets at regular intervals,

[3] The declaration of health for a ship or aircraft is a form of health log in which are recorded any cases of, or deaths from, infectious disease among passengers and crew during the voyage, in addition to other information relative to the ship or aircraft and its ports of call. It is presented at the port of arrival.

[4] The bill of health is a document issued by the health authority of the port of departure which testifies to the sanitary condition of the port and of the ship at the time of departure (see page 279).

adopts certain regulations, all the Members automatically become bound thereby, unless they notify the Director-General of the Organization, within a specified period, that they wish to reject or to offer reservations to the regulations. No further action on the part of the Member States is necessary. This is, in effect, an innovation in treaty-making, one particularly well suited to a technical, international agreement which has to keep pace with the changing epidemiological situation, the experience gained, and progress in science and disease-control techniques.

In the case of the International Sanitary Regulations, the period for rejection or reservations was nine months from 11 June 1951, the date on which notification was sent by the Director-General. Eighteen months from this date were allowed, however, for overseas or other outlying territories for whose international relations a Member State might be responsible, on condition that the Director-General be notified before 11 March 1952, the end of the nine-month period. The Regulations entered into force on 1 October 1952.

Special provisions were made for States which might become members of WHO after the date of entry-into-force of the Regulations and for States not members which might wish to become parties to the Regulations. With regard to the former, it was specified that a new Member which was not already party to the Regulations might notify its rejection of, or any reservation to, the Regulations within a period of three months from the date on which it became a Member of WHO, and that otherwise the Regulations would come into force for that State upon expiry of the three-month period. With regard to non-members, they were permitted to notify the Director-General of their acceptance; and, like Member States, they became bound by the Regulations on the date of their entry-into-force; if the acceptance were notified after that date, they would become bound by the Regulations three months after the date of receipt by the Director-General of the notification of acceptance.

Particular attention was paid to the procedure relative to reservations. In this, too, the Health Assembly was given a degree of control, in order to avoid the difficulties and disadvantages inherent in obtaining individual acceptance of reservations by the various Member States of WHO. It was provided that no reservation offered by a State would be valid unless it was accepted by the World Health Assembly. The Health Assembly withholds its acceptance only on solid grounds; but it has the duty and the power to object to a reservation when it is of the opinion that such a reservation may substantially detract from the character and purpose of the Regulations. Should a reservation not be accepted, the Regulations do not enter into force with respect to the State in question until the reservation has been withdrawn. In other words, a State which does not withdraw a reservation to which the Assembly objects is in the same position as if it rejects the Regulations as a whole. Such States remain bound by any of the previous international sanitary conventions and similar agreements to which they may have been party—i.e., the international sanitary conventions of 1903, 1912, 1926, 1933, and 1944; the Pan American Sanitary Convention, 1905; and the various other international agreements, conventions and protocols which the Regulations replace. The Health Assembly may, under certain circumstances, accept a reservation conditionally.

Acceptances, reservations, and rejections

Of a possible 89 countries, only 25, by submitting limited reservations, did not fully accept the Regulations. This general approval by national administrations was a welcome

initiation to the new type of international sanitary agreement concerning world movement of ships and aircraft.

The 25 governments submitting reservations had these duly examined by the Fifth World Health Assembly. The number of individual reservations was 73; of these, 38 were rejected by the Health Assembly.

The position of States and territories under the International Sanitary Regulations on 1 October 1956 is shown in Annex 3, page 336.

SOME PROVISIONS OF THE REGULATIONS

The International Sanitary Regulations cover a variety of subjects, among them notifications and epidemiological information (see page 323); sanitary organization, in which are specified the obligations laid upon health authorities with regard to sanitary conditions at ports and airports; sanitary measures and procedure, in which the maximum measures applicable on departure, on arrival, and between ports and airports of departure and arrival, and measures concerning the international transport of goods, baggage, and mail are described; special provisions relating to each of the quarantinable diseases (see below); sanitary documents; and sanitary charges.[5]

Of particular interest for this review are the provisions relative to each of the quarantinable diseases and to the Mecca Pilgrimage, the major points of which are summarized below.

Plague

Vaccination against plague is not to be required as a condition of admission of any person to a territory.

Each State is called upon to employ all means in its power to diminish the danger of spread of plague by rodents and their ectoparasites, and to keep itself informed of the conditions in any local area, especially any port or airport, infected or suspected of being infected by rodent plague. Special care is to be taken to prevent the introduction of rodents on board a ship or aircraft during its stay in a plague-infected port or airport.

Ships are required to be periodically deratted, or permanently kept in such a condition that the number of rodents on board is negligible. A deratting certificate or deratting exemption certificate, which is valid for six months, is to be issued only by the health authority for a port approved for that purpose. An aircraft may be deratted in exceptional circumstances of an epidemiological nature when the presence of rodents is suspected on board.

Before departure on an international voyage from a local area where there is an epidemic of pulmonary plague, every suspect must be placed in isolation for a period of six days (considered, for purposes of the Regulations, as the incubation period of plague) reckoned from the date of the last exposure to infection.

A ship or an aircraft is to be regarded as infected if it has a case of human plague on board, or if a plague-infected rodent is found on board. A ship is also to be regarded as infected if a case of human plague has occurred on board more than six days after embarkation. A ship is to be regarded as "suspected" if it has no case of human plague on board but such a case has occurred on board within the first six days after embarkation, or if there is evidence of an abnormal mortality among rodents on board of which the cause is not known.

On arrival of such a ship or aircraft, the health authority may disinsect any suspect and put him under surveillance for a period of not more than six days reckoned from the date of arrival; disinsect and, if necessary, disinfect the baggage of an infected person or suspect and any other article (e.g., used

[5] The text of the Regulations is contained in *World Health Organization: Technical Report Series*, 1951, No. 41; the Additional Regulations are found in *Off. Rec. Wld Hlth Org.*, 1955, **64**, 84-86; 1956, **72**, 80-83.

bedding or linen) and any part of the ship or aircraft which is considered to be contaminated. If there is rodent plague on board a ship, it must be deratted, if necessary in quarantine. If a rodent which had died of plague is found on board an aircraft, the aircraft is to be deratted, if necessary in quarantine.

A ship ceases to be regarded as infected or suspected, or an aircraft to be regarded as infected, when the measures required by the health authority have been effectively carried out—i.e., any infected person has been removed and isolated, and the prescribed disinsecting, disinfection, and deratting have been performed—or when the health authority is satisfied that abnormal mortality among rodents on board is not due to plague. The ship or aircraft is then given free pratique. A healthy ship or aircraft is given free pratique on arrival unless it has come from an infected local area,[6] in which case the health authority may place under surveillance any suspect who disembarks, for a period of not more than six days reckoned from the date on which the ship or aircraft left the infected local area, and may require the destruction of rodents on board a ship in exceptional cases and for well-founded reasons, which must be communicated in writing to the ship's master.

[6] An "infected local area", as defined in the Regulations, is (*a*) a local area where there is a non-imported case of plague, cholera, yellow fever, or smallpox; or (*b*) a local area where plague infection among rodents exists on land or on craft which are part of the equipment of a port; or (*c*) a local area where activity of yellow-fever virus is found in vertebrates other than man; or (*d*) a local area where there is an epidemic of typhus or relapsing fever.

Ship deratization equipment (By courtesy of the US Public Health Service)

Routine fumigation of a ship with cyanide discoids

(Photograph by the Washington Post. Reproduced by courtesy of the US Public Health Service)

If a case of human plague is discovered on arrival of a train or a road vehicle, the infected person may be removed and isolated and disinsecting and, if necessary, disinfection be applied as required by the health authority, within the limits specified by the Regulations.

Cholera

The possession of a valid certificate of vaccination against cholera is to be taken into consideration by a health authority in applying the relevant measures prescribed in the Regulations. Any standard for anti-cholera vaccines in force in the territory where the vaccination has been performed must be accepted by all health administrations.

A person on an international voyage who has come from an infected local area within the five days considered, for the purpose of the Regulations, as the incubation period of cholera may, if he has a valid certificate of vaccination, be placed under surveillance for a period of not more than five days reckoned from the date of his departure from the infected local area; if he does not possess such a certificate, he may be placed in isolation for a like period. No one is required to submit to rectal swabbing; and only a person on an international voyage who has come from an infected local area within the incubation period of cholera and who has symptoms indicative of the disease may be required to submit to stool examination.

A ship is to be considered infected if, on arrival, it has a case of cholera on board or if a case of cholera has occurred on board during the period of five days before arrival. It is regarded as suspected if a case of cholera has occurred on board during the voyage but there has been no fresh case during the five days before arrival.

An aircraft is to be considered infected if, on arrival, it has a case of cholera on board, and as suspected if a case has occurred on board during the voyage but the person has previously been disembarked.

A ship or an aircraft which has come from an infected local area or has on board a person coming from such an area is to be regarded as healthy if, on medical examination, the health authority is satisfied that no case of cholera has occurred on board during the voyage.

On arrival of an infected ship or aircraft:

1. Any passenger or crew member who produces a valid certificate of vaccination against cholera may be placed under surveillance for a period of not more than five days reckoned from the date of disembarkation, and all others who disembark may be isolated for the same period.

2. Any baggage of an infected person or suspect, and any other article (e.g., used bedding or linen) and any part of the ship or aircraft which is considered to be contaminated may be disinfected; and any water carried on board which is considered to be contaminated may be disinfected and removed and the containers disinfected.

3. Human dejecta, waste water and waste matter, and any matter which is considered to be contaminated must not be discharged or unloaded without previous disinfection. The safe disposal of all such material is the responsibility of the health authority.

A suspected ship or aircraft may be similarly disinfected, and any passenger or crew member who disembarks may be placed under surveillance for a period of not more than five days reckoned from the date of arrival.

A ship or aircraft ceases to be regarded as infected or suspected when the measures required by the health authority in accordance with the above have been effectively carried out and any infected person has been removed and isolated.

Surveillance of any suspect for a period of not more than five days reckoned from the date of arrival and disinfection as described above may also be applied on arrival of a train or a road vehicle in which a case of cholera has been discovered.

Certain precautions must be taken with regard to food aboard an infected or suspected ship or aircraft, a train or road vehicle on which a case of cholera has been discovered, or any of these which has come from an infected local area: the health authority may remove, or prohibit the unloading of, fish, shellfish, fruit or vegetables which are to be consumed uncooked, or beverages, unless they are in sealed containers and the health authority has no reason to believe that they are contaminated. Any such food or beverage which is removed must be safely disposed of.

Yellow fever

The provisions concerning yellow fever in the International Sanitary Regulations have been the subject of most controversy. At the Eighth World Health Assembly, Additional Regulations were adopted which altered some of the original provisions with regard to this disease. The summary which follows takes these alterations into account.

Health administrations are required to notify WHO of the area or areas within their territory where the conditions of a yellow-fever receptive area exist and to report any change in these conditions promptly. The Organization subsequently transmits this information to all health administrations.

Vaccination against yellow fever is necessary for any person leaving an infected local area [7] on an international voyage and proceeding to a yellow-fever receptive area.

[7] See (*a*) and (*c*) of note 6, page 317.

If such a person has a certificate of vaccination which is not yet valid, he may be permitted to depart but may, on arrival, be isolated until his certificate becomes valid or until a period of not more than six days (i.e., the period of incubation) reckoned from the date of the last possible exposure to infection has elapsed, whichever occurs first. A person possessing a valid certificate is not to be treated as a suspect, even if he has come from an infected local area. Everyone employed at an airport situated in an infected local area and every member of the crew of an aircraft using such an airport must have a valid certificate of vaccination against yellow fever.

A health authority in a yellow-fever receptive area may require a traveller on an international voyage who has come from an infected local area and who does not possess a valid certificate of vaccination to be isolated until his certificate becomes valid or

Aerosol disinsectization of aircraft : spraying o wheel nacellae

(By courtesy of the British Overseas Airways Corporation. In: Whittingham, Sir Harold E. (1954) *J. roy. Inst. publ. Hlth*, 17, 110)

until a period of not more than six days reckoned from the date of last possible exposure to infection has elapsed, whichever occurs first.

Every aircraft leaving an airport situated in an infected local area and bound for a yellow-fever receptive area must be disinsected, under the control of the health authority, as near as possible to the time of its departure but in sufficient time to avoid delaying such departure. The States concerned may accept the disinsecting in flight of the parts of the aircraft which can be so disinsected. Every ship or aircraft leaving a port or airport where *Aëdes aegypti* still exists and bound for a port or airport where this vector has been eradicated must be similarly disinsected.

A ship is to be regarded as infected if it has a case of yellow fever on board on arrival or if a case has occurred on board during the voyage; it is to be considered suspected if it has left an infected local area less than six days before arrival or, if arriving within 30 days of leaving such an area, the health authority finds *Aëdes aegypti* on board. An aircraft is to be considered infected if it has a case of yellow fever on board, and suspected if the health authority is not satisfied with a disinsecting carried out as described above and finds live mosquitos on board.

In a yellow-fever receptive area, any passenger or member of the crew who disembarks from an infected or suspected ship or aircraft and who is unable to produce a valid certificate of vaccination against yellow fever may be isolated until his certificate becomes valid or until a period of not more than six days reckoned from the date of last possible exposure to infection has elapsed, whichever occurs first. Infected or suspected ships or aircraft may, on arrival, be inspected for the presence of *Aëdes aegypti* and measures taken to destroy these vectors.

In a yellow-fever receptive area, a ship may be required to remain at least 400 m from land until such measures have been carried out. The ship or aircraft ceases to be regarded as infected or suspected when any infected persons have been removed and isolated and the requirements of the health authorities have been met. A healthy ship or aircraft coming from an infected local area may be subjected to inspection and destruction of any *Aëdes aegypti* on board; and a ship may, in a yellow-fever receptive area, be kept at a distance of 400 m from land until this has been accomplished.

While aircraft which have been properly disinsected are not to be prohibited from landing at any sanitary airport within a territory, in a yellow-fever receptive area aircraft coming from an infected local area may land only at airports specified by the State for that purpose.

A train or a road vehicle arriving in a yellow-fever receptive area from an infected local area may be disinsected. Passengers from an infected local area who are unable to produce a valid certificate of vaccination may be isolated as indicated above.

In a yellow-fever receptive area, the isolation provided for in the Regulations must be in mosquito-proof accommodation.

Smallpox

Any traveller on an international voyage who does not show sufficient evidence of protection by a previous attack of smallpox or who cannot produce a valid certificate of vaccination against the disease may be vaccinated or, if he refuses to be vaccinated, may be placed under surveillance for not more than 14 days (considered the incubation period of smallpox) reckoned from the date of his departure from the last territory visited before arrival. A person who has visited an infected local area during a period of 14 days before his arrival and who, in the opinion of the health authority, is not sufficiently protected by vaccination or by a

previous attack of smallpox may be required to be vaccinated, or may be placed under surveillance, or may be vaccinated and then placed under surveillance; if he refuses to be vaccinated, he may be isolated. The period of surveillance or isolation is not to be more than 14 days reckoned from the date of his departure from the infected local area. A valid certificate of vaccination against smallpox is to be considered evidence of sufficient protection.

A ship or aircraft is to be regarded as infected if it has a case of smallpox on board on arrival or if such a case has occurred on board during the voyage. Any other ship or aircraft is to be regarded as healthy and given free pratique, even if it has come from an infected local area or has suspects on board, though the suspects may, on disembarking, be subjected to the measures provided for with respect to infected ships.

On arrival of an infected ship or aircraft, the health authority must offer vaccination to any person on board who, in its opinion, is not sufficiently protected against smallpox; must disinfect any baggage of an infected person and any other articles and any part of the ship or aircraft which is considered to be contaminated; and may isolate or place under surveillance, for a period of not more than 14 days reckoned from the last exposure to infection, any person disembarking, due account being taken of previous vaccinations of the person in question and the possibility of his having been exposed to infection in determining the period of such isolation or surveillance. The ship or aircraft must continue to be considered infected until every infected person has been removed and the above measures have been effectively carried out as required by the health authority, after which it is given free pratique.

If a case of smallpox is discovered on an arriving train or road vehicle, the infected person must be removed and the procedures specified for an infected ship or aircraft be carried out, with the period of surveillance or isolation being reckoned from the date of arrival and the disinfection being applied to any part of the train or road vehicle which is considered to be contaminated.

Typhus

Vaccination against typhus is not to be required as a condition of admission of any person to a territory.

A person departing from an infected local area on an international voyage whom the health authority for that area considers liable to spread typhus must be disinsected: the clothes he is wearing, baggage, and any other article likely to spread typhus must be disinsected and, if necessary, disinfected.

A person on an international voyage who has left an infected local area within the previous 14 days (considered the incubation period of typhus) may, if the health authority for the place of arrival considers it necessary, be disinsected and put under surveillance for a period of not more than 14 days reckoned from the date of disinsecting. The clothes which such a person is wearing, his baggage, and any other article likely to spread typhus may be disinsected and, if necessary, disinfected.

A ship or an aircraft is to be regarded as healthy even if it has an infected person on board, but such a person may be removed and isolated and any suspect may be disinsected, as may also the accommodation occupied by the infected person or by a suspect, the clothes they are wearing, their baggage, and any other article likely to spread typhus. These items may also be disinfected if necessary. The same provisions may be applied if a case of typhus is discovered on a train or a road vehicle.

Relapsing fever

The articles regarding typhus apply also to relapsing fever, but the period of surveillance should be no more than eight days

(considered the incubation period of relapsing fever) reckoned from the date of disinsecting.

The Mecca Pilgrimage

One of the greatest periodic mass movements and assemblies of people is the Mecca Pilgrimage, which yearly brings hundreds of thousands of Moslem pilgrims to the Hedjaz. The Pilgrimage has always presented numerous health hazards. In 1865 its significance in the transmission of infectious disease became alarmingly apparent: cholera broke out in Mecca, and the general flight which followed spread the disease far and wide. The role of the Pilgrimage was consequently one of the main topics considered in 1866 at the third international sanitary conference (see page 277). Thereafter, the Pilgrimage remained a recognized international health concern.

When the International Sanitary Regulations were drafted, it was considered advisable to include in them certain special provisions for the health control of the Mecca Pilgrimage, despite the fact that the measures set forth in the main body of the Regulations were meant to apply equally to the Pilgrimage. Accordingly, there were two annexes concerning the Pilgrimage, one dealing with the sanitary control of pilgrim traffic approaching or leaving the Hedjaz during the season of the Pilgrimage, and the other with standards of hygiene and welfare on pilgrim ships and on aircraft carrying pilgrims.

At the Ninth World Health Assembly, in May 1956, the decision was taken to abrogate the sections dealing specifically with the Mecca Pilgrimage. This decision was based on the advice of a group of quarantine experts who visited Jeddah in March 1956 and of the Committee on International Quarantine. It was felt that the health administration of Saudi Arabia was fully equipped to deal with all sanitary problems connected with the Pilgrimage within its territory.

To take care of any possible need for special measures with regard to pilgrims which might arise from time to time, certain Additional Regulations were adopted by the Health Assembly.[8] These specify that measures applying to pilgrims should be the same as those applied to other international travellers or to migrants and seasonal workers as " persons taking part in periodic mass congregations ". The States bound by the Additional Regulations undertake to require adequate standards of hygiene and accommodation on ships and aircraft carrying persons taking part in periodic mass congregations. These standards must not be lower than those required under the International Sanitary Regulations before the entry-into-force of the Additional Regulations. The Additional Regulations are to come into force on 1 January 1957.

MACHINERY FOR APPLYING AND ADMINISTERING THE REGULATIONS

Epidemiological intelligence

The successful application of the International Sanitary Regulations depends on the dissemination of complete, reliable, and up-to-date information on the appearance of quarantinable diseases in each State and territory. The Regulations lay on health administrations definite responsibilities to notify WHO of the appearance of quarantinable disease in their territory, by air mail and, in certain cases, by telegram, and to supply supplementary reports if the presence of the disease continues. The Organization, in its turn, has the responsibility of sending this information to all health administrations.

This service implies three conditions: (1) rapid transmission to WHO by States of the epidemiological intelligence relating to

[8] *Off. Rec. Wld Hlth Org.*, 1956, 72, 80

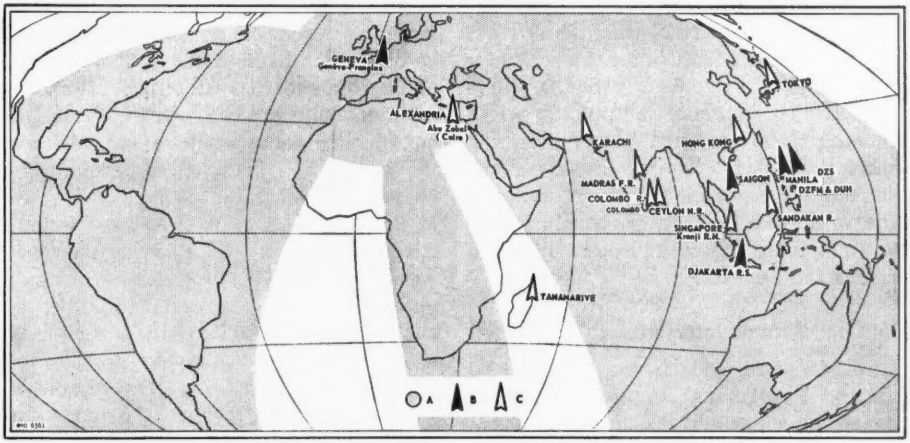
A desk at the Geneva central post office is reserved for the reception by, and transmission from, WHO Headquarters of bulletins.
Other steps in the dissemination of essential information include radio broadcasts of bulletins and publication of relevant information in the Weekly Epidemiological Record.

quarantinable disease in their territories; (2) existence in WHO of an effective machinery for the reception, compilation, and rapid transmission of this information to all States; and (3) reception and use by all States of this information as far as they themselves deem it desirable and necessary.

With regard to the first, WHO can transmit only the information it receives officially from government departments. It cannot rely on press reports or information from unofficial sources; frequently, however, reports of outbreaks are first received from unofficial sources and are later confirmed by official communications. Sometimes there are reasons for such delays in notification; but many States could, in this respect, improve their co-operation with WHO and, through it, with other States.

WHO's quarantine intelligence and information services comprise units at Geneva, Singapore, Washington, and Alexandria. The urgent information received is transmitted throughout the whole world by means of a series of radio bulletins. These bulletins are transmitted daily from Geneva (on eight wavelengths in English and on four in French); from Singapore and from Alexandria at less frequent intervals; and daily over a wide network in the Indian Ocean and

MAP 7. STATIONS TRANSMITTING WHO RADIO-TELEGRAPHIC EPIDEMIOLOGICAL BULLETINS



A = *areas reached by Genève-Prangins stations* B = *stations transmitting daily*
C = *stations transmitting once or twice a week*

western Pacific areas, through 12 stations. Map 7 shows the wireless stations transmitting WHO radio-telegraphic epidemiological bulletins.

The information contained in the epidemiological bulletins is confirmed, and, together with other information on the application of the Regulations, appears in weekly publications prepared in Geneva, Singapore, Washington, and Alexandria and sent by air mail to health administrations.

The lists of reports and notifications which must be sent to WHO under the Regulations is a formidable one, containing 29 separate items, each requiring a communication or, in some instances, periodic communications to WHO. While health administrations do not all have the same degree of development and cannot all be expected to submit regularly the returns required, there are some which are not yet co-operating to the extent which the development of their services would permit. There is noticeable improvement, however; and, as time passes and the changing position of the quarantinable diseases necessitates revision of the Regulations, it may be anticipated that the administrative burden of supplying all the notifications and reports now required may become less heavy.

The WHO organ for publication of all the necessary epidemiological notifications is the *Weekly Epidemiological Record*, which is a legacy from the League of Nations and is in its thirty-first year. In addition to serving as a means of communicating notifications relating to the quarantinable diseases, the *Record* contains other information about the application of international sanitary legislation and notes, based on current statistical data, on the incidence of certain non-quarantinable diseases, such as influenza and poliomyelitis, whenever their prevalence becomes of international importance. Supplements to the *Record* provide valuable summaries of information relative to the Regulations, such as lists of the quarantine measures and vaccination certificate requirements of all countries as reported to WHO,[9]

[9] *Wkly epidem. Rec.*, 1955, 2, Suppl. 1

or the tariffs of sanitary charges in force as of a certain date.[10]

The *Weekly Epidemiological Record* has become an integral part of the machinery for administering the International Sanitary Regulations. The essential information which it contains has to reach all governments and others concerned with quarantine application, and the *Record* is therefore distributed on a world-wide basis to health administrators, quarantine offices, and other interested persons and agencies.

The Committee on International Quarantine

Provision was made in the International Sanitary Regulations for the settling of possible questions and disputes with regard to their application: The Director-General was authorized to deal with questions or disputes and settle them as far as might be practicable; but, if a settlement could not thus be reached, the matter was to be referred to an appropriate committee or other organ of WHO for examination and settlement. Accordingly, the Committee on International Quarantine was established and was assigned other functions in addition to the settlement of disputes. Specifically, this committee was entrusted with the tasks of reviewing annually the application of the Regulations and other relevant legislation, recommending amendments and additional regulations as necessary, and generally interpreting the Regulations and solving problems with regard to their application.

APPLICATION AND WORKING OF THE REGULATIONS

Although the International Sanitary Regulations mark an important advance in quarantine procedure, like anything new they require some time to become completely integrated into current practice. Their functioning during the first four years of their existence may be considered satisfactory; and the spirit in which they are being applied bears evidence of a desire for mutual co-operation, understanding, and goodwill among the countries concerned. Numerous questions have arisen which have called for considerable correspondence and advice on the part of the Director-General; discussion, recommendations, and counsel on the part of the Committee on International Quarantine; and, in some cases, action by the Health Assembly. But with the passage of time the difficulties are fewer, and the day-to-day administration of the Regulations is a simpler task. Most significant, no problem has assumed the proportions of a dispute requiring settlement by the Committee on International Quarantine.

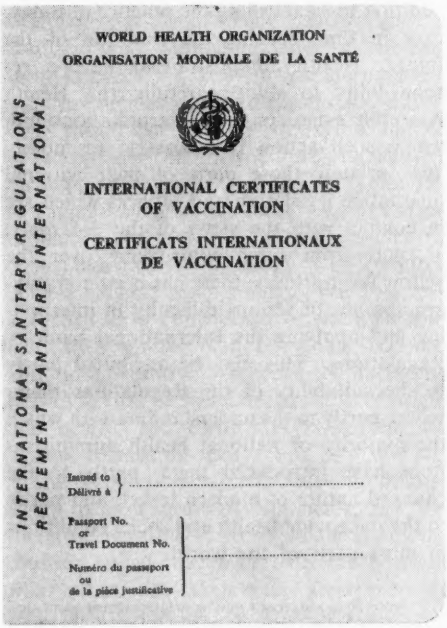
The first year of operation of the Regulations was undoubtedly difficult for national administrations, local authorities, transport companies, and individual travellers. Procedures and practices which had been followed for a century or more had to be changed; measures previously thought necessary for the protection of a country against importation of the quarantinable diseases had to be amended or suppressed entirely; and national legislation in almost all countries had to be reviewed and revised.

The application of the technical provisions relative to the individual diseases has given rise to little difficulty; most of the questions have concerned interpretation of definitions, notifications and epidemiological intelligence, and sanitary documents.

The recurring problems are, generally speaking, related to bills of health and sanitary charges, largely because national practice in some countries does not yet conform to the International Sanitary Regulations. It is interesting to note that, despite the stage of development of WHO's epidemiological services and the regular dissemination of reliable information throughout the world, the archaic bill of

[10] *Wkly epidem. Rec.*, 1955, 46, Suppl. 5

health still retains a position of exalted importance in some countries. Old traditions die hard, and the bill of health is proving one of the most tenacious in clinging to its unnatural life, although it long ago ceased to serve any useful purpose.



The international vaccination certificate booklet

The international certificates of vaccination seem to have caused some difficulties. Many physicians still fail to employ the standard international vaccination certificates; [11] questions of validity and authenticity frequently arise; and variations in the method of recording dates have led to complications. To avoid the confusion which resulted from the fact that some countries in numerically recording the date put the month before the day while others note the day before the month, it has been requested that all dates be written thus: day in arabic numbers, month in letters, year in arabic numbers (e.g., 1 February 1957).

Other problems have arisen with regard to vaccination and have required interpretation by the Committee on International Quarantine. For example, the question of minimum age for vaccination was posed (there is no mention of age in either the Regulations or the vaccination certificates). The Committee made no recommendation for exemption on account of age for yellow fever or smallpox vaccination, but did recommend that the health authorities of countries of arrival should not require certificates of vaccination against cholera for children under one year of age. Another question arose concerning exemption from vaccination on medical grounds. On this point the Committee stated that, if the vaccinator was of the opinion that vaccination was contra-indicated on medical grounds, he should provide the person in question with written reasons for his decision, which the health authority might take into account.

The yellow fever provisions of the Regulations have been the subject of most difficulty.

The Eighth World Health Assembly, as previously mentioned, adopted Additional Regulations modifying the original articles concerning yellow fever; and the Ninth World Health Assembly reviewed and accepted the reservations of certain governments to the amended clauses, which came into force 1 October 1956.

In his annual report on the working of the International Sanitary Regulations, the Director-General summarizes the notifications of quarantinable diseases on ships and aircraft as published by WHO during the period covered. The occurrence of quarantinable diseases on ships is reported to the Organization, which then transmits the information directly by telegram to the health administration of the country of the ship's next port of call and publishes it in its

[11] A standard form is prescribed in the Regulations and has been printed by WHO.

epidemiological bulletins and in the *Weekly Epidemiological Record.* In accordance with arrangements made in the area in liaison with the Epidemiological Intelligence Station in Singapore, such notifications are not normally made if the voyage to the next port is to be less than five days; in that case the health authority of the port at which the infected case is disembarked makes the notification.

From 1 October 1952 to 30 June 1955, 45 ships were notified as being infected with, or suspected of being infected with, one of the quarantinable diseases: in 12 instances, with cholera; in 28, with smallpox; and in 5, with typhus. Many of the cases were not confirmed, however; and some were later reported as having been finally diagnosed as other diseases. There have been no notifications of ships infected with plague, yellow fever, or relapsing fever.

The first notification of an infected aircraft reached WHO in 1955. It concerned a passenger from London who had disembarked en route at several airports in the Far East and who died of smallpox in Calcutta a few days after his arrival.

Each year, the Committee on International Quarantine reviews the Director-General's report and the reports of individual Member States and others on the working of the Regulations, gives its opinion on any matters which require decision or clarification, and refers to the Health Assembly questions which require its action.[12] The Health Assembly's acceptance of the Committee's recommendations on particular points serves as interpretation of articles which have been causing difficulties. These interpretations are of considerable importance since they represent decisions and precedents which, in addition to establishing the practice of today, may in time become the tradition of the future. Health administrations have a responsibility to study carefully the Health Assembly's decisions and interpretations and, where such action is necessary, to modify appropriately those parts of their national quarantine legislation and services which are in conflict with the views of the Assembly.

Apart from some controversy over the yellow fever articles, there has been a gratifying absence of serious difficulty in interpreting and applying the International Sanitary Regulations. This may be attributed partly to the suitability of the Regulations themselves, partly to the understanding with which the majority of national health administrations have introduced them, partly to the changed nature of modern travel, and partly to the improving health and social conditions in most parts of the world.

[12] Proceedings and reports relating to international quarantine, including the annual reports of the Director-General and extracts from reports from individual States on the working of the Regulations, the reports of the Committee on International Quarantine, and the relevant proceedings and decisions of the Health Assemblies, may be found in *Official Records of the World Health Organization* Nos. 56, 64, and 72.

A LOOK TOWARDS THE FUTURE

Quarantine is but one facet of international health, and the extent to which it must be applied depends upon many other health factors. As countries improve their sanitary conditions and successfully control communicable diseases, quarantine lessens in importance.[1] Health authorities are therefore concentrating on eliminating the sources and vectors of disease within their own borders and on utilizing modern means of disease prevention, and are not relying

[1] Gear, H. S. (1948) *Brit. med. J.*, 1, 1092

solely on quarantine measures to keep out disease.

The present International Sanitary Regulations nevertheless represent a noteworthy step in efforts to check the spread of disease from one country to another. Furthermore, they are a significant advance in international health co-operation. They have reduced a confused and conflicting mass of cumbersome conventions to a single, international, legal instrument applied to trade and travellers; they have tested a flexible technique of acceptance of international regulations through adoption by the Health Assembly, as a replacement for the old, slow negotiation of many separate treaties; they have achieved some measure of harmony with modern epidemiological and public health practice; and they have contributed to the abandonment of a number of questionable technical and administrative requirements, including bills of health, personal declarations of origin and health, and certificates of vaccination against certain diseases.

The Regulations were deliberately drafted to try to meet future developments, and it is therefore permissible to speculate about the changes which may occur, on the basis of what has already taken place. Certain trends are clearly discernible, particularly with regard to the quarantinable diseases themselves.

A century ago, cholera roamed unchecked along the trade and pilgrim routes and spread to most countries; today it is restricted to a few Asian endemic foci whence it rarely emerges, and then only into a few adjacent territories. This remarkable transformation has followed progress in many human activities—better government, improved local administration, higher social standards, more extensive medical services, and fuller use of simple sanitary services. In fact, the disappearance of cholera from an area signifies much social and economic advancement.

The intensive efforts now being made by those countries in which cholera is still endemic to improve sanitary conditions gives promise that the disease may soon be conquered everywhere. These countries are helping themselves and the rest of the world by raising their sanitary standards; and, when cholera is eliminated from them in the not-too-distant future, a whole chapter of international sanitary history will close. Travellers and goods will move more freely, and quarantine authorities will have one concern less.

Plague has also shown most significant changes in the extent and severity of its epidemics. Science has provided the means of controlling and preventing this infection which spreads easily from rodent to human and among humans. Further, modern treatment has reduced its killing force, so terrifying in the past.

It will not be long before most ports, and indeed most communities, will feel secure against plague in having rid themselves of domestic rodents and having established adequate medical services. The persistence of plague as an infection of rural rodents may continue to be of concern to local authorities in many areas, since there are as yet no practical means of abolishing such enzootics; but, in view of the protective measures now available, this need not be given too much consideration in international traffic. However, despite the probable early acceptance of the fact that plague is no longer a problem in international traffic, there should be no lowering of sanitary requirements for ships and ports, and no relaxation of efforts to keep ships and warehouses free from rats.

Relapsing fever and typhus, historically phenomena associated with social disorder, are likely to re-emerge only if there is again a deterioration of social conditions, for one reason or another. With the means of destroying lice which are available today, few countries tolerate the presence of these carriers of disease. The louse-borne diseases are consequently now of little concern in

international traffic, and the regulations which apply to them are almost never used. Here, too, the end of another chapter in quarantine history is in sight.

Smallpox continues to be a nuisance in international quarantine practice, but even this highly infectious disease is receding. Like cholera, smallpox reflects the sense of responsibility of a community; and most countries are now dealing vigorously with it. Control campaigns, particularly through vaccination, should soon make smallpox join the other diseases which are passing from the active quarantine scene.

Yellow fever is the most serious problem in international quarantine. The fears of the so-called " receptive " areas have legitimate grounds: the local human and primate populations are almost certainly susceptible; the local *Aëdes aegypti* and other species are probably capable of transmitting the virus; and climatic and other ecological conditions would seem suitable for the spread of the disease.

Nevertheless, there is much cause for optimism. The member countries of the Pan American Sanitary Organization have demonstrated the means of eliminating *Aëdes aegypti* and abolishing urban yellow fever, and their example may be followed in other areas. Yellow fever vaccine, which is simple and effective, is another valuable weapon in combating this disease. Even in an emergency, the techniques available today—destruction of *Aëdes aegypti* through modern insecticides, larval control, and immunization of human populations—are relatively easy to organize and apply. The medical administrator who has them at hand is in a much better position than his colleague of a hundred years ago, who was helpless to deal with yellow fever.

There remains the threat of importation of rural or jungle forms of the disease. Remote though the foci of jungle yellow fever are from possible contact with international travellers, they represent a menace to the receptive countries. The present state of knowledge does not yet provide the answer to means of dealing with the foci of jungle yellow fever, but the intensive work now in progress may eventually solve this problem.

Though yellow fever is likely to be of concern in international quarantine for some time to come, there is sufficient evidence to justify the belief that its importance will diminish. This is not to imply that some chance may not introduce the infection into a receptive area. Yet such introduction is as likely to be by some casual craft or vehicle as by a modern, scheduled, passenger ship or aircraft.

With regard to the present quarantine measures concerning yellow fever, there is hope that the existing conglomeration of regulations, additional regulations, and reservations thereto will be considerably simplified.

A factor which may improve the future administration of the International Sanitary Regulations is better and more widespread knowledge of the exact significance of the quarantinable diseases today. The fears of earlier times still persist to too great an extent. The words " plague ", smallpox ", " cholera ", and " typhus " will probably not lose their grim associations very soon. The occasional violent and excessive reaction to any outbreak of these diseases is therefore understandable. But such reactions will become less common as the public becomes better informed. There are fewer and fewer quarantine officers whose epidemiological knowledge is not up to date and who still deal with communicable diseases in terms of inappropriately drastic measures—isolation, quarantine, and prohibition of movement of people and goods—at immense direct and indirect cost. It is more frequently the pressure of an alarmed and unenlightened community or its official representatives which demands such evidence of action on

the part of its medical authorities. Once they are aware that the quarantinable diseases are not the menace of the past, that they are largely controllable and treatable, communities, through their health and medical services, will more and more adjust their demands to reality. Unnecessary, costly, quarantine measures should thus gradually disappear.

Another element in the future of international quarantine, as has been already stated, is the rapid improvement of social and health conditions throughout the world. The comprehensive programmes of health improvement and social and economic development which are being carried out by many governments, often with assistance from WHO and other international organizations, are a direct contribution to the control and eventual elimination of the quarantinable diseases. As living conditions improve, the significance of plague, cholera, typhus, and the other quarantinable diseases declines. Such considerations strengthen the argument that the day is rapidly approaching when quarantine barriers will no longer be necessary.

The present review has given some idea of the vast scale of international traffic and trade, and of its meaning in terms of raising living standards, getting food, extending knowledge, etc. The world is unquestionably on the eve of an enormous growth of international sea, land, and air travel which will require the utmost freedom from unwarranted obstruction. No medical measure which is not in harmony with modern epidemiology and whose cost is out of proportion to its results will be justifiable. It will therefore become essential for medical advisers to consider in their assessment of quarantine practice not only the strictly technical factors, but also many others which have a bearing on the nutritional, social, and economic well-being of their communities.

The irresistible size and significance of rapidly growing world transport will make the application of old-fashioned quarantine techniques of little avail. Another type of action will therefore be called for if ever it is necessary to deal with international traffic as a factor in the spread of diseases other than the present quarantinable group. Even today, in spite of many claims to the contrary, there is too frequent use of isolation and quarantine measures against international travellers in the name of controlling infections such as influenza, poliomyelitis, and others. Such diseases may remain "quarantine" problems for some time; but it is doubtful if the present type of international sanitary regulations should ever be extended to them.

International quarantine is a subject close to the origins and evolution of all international health co-operation. It has a century of progress behind it, including remarkable changes during the last two decades. It has even more significance in that it has helped, in no small way, to teach governments the value and practicality of international discussion and negotiation in dealing with any subject. Its successes have helped to extend knowledge, understanding, and better living; and a worthy place in the world history of nations and of medicine should be accorded it.

ANNEX 1

INTERNATIONAL QUARANTINE: DATES AND EVENTS

1851 First international sanitary conference, Paris. Convention drawn up but ratified by only three countries, two of which withdrew from it in 1865.

1859 Second conference, Paris. Draft convention only.

1866 Third conference, Constantinople. Concerned largely with cholera and means of stopping its spread, including measures for sanitary control of Mecca Pilgrimage.

1874 Fourth conference, Vienna. Draft convention for a permanent international commission on epidemics prepared.

1881 Fifth conference, Washington, D.C. Dealt particularly with yellow fever. Proposal for a system of exchange of epidemiological information.

1885 Sixth conference, Rome. Recommendations on various subjects, but no convention.

1892 Conference in Venice. Convention on Mecca Pilgrimage signed and ratified.

1893 Conference in Dresden. Convention on cholera signed by ten nations.

1894 Further convention on Pilgrimage signed at Paris conference. Ineffective.

1897 Conference in Venice. Convention drawn up and signed by 18 countries. Dresden convention of 1893 ratified. Compulsory telegraphic notification of first cases of plague unanimously accepted.

1903 International sanitary convention consolidating those of 1892, 1893, 1894, and 1897 signed in Paris.

1905 Pan American Sanitary Convention, modelled on Paris convention, signed in Washington, D.C.

1907 Agreement signed in Rome for the establishment in Paris of the Office International d'Hygiène Publique.

1912 1903 convention amended at Paris conference. Most important changes concerned yellow fever.

1924 Pan American Sanitary Code signed by 18 American republics, in Havana.

1926 Convention amending that of 1912 signed in Paris. Typhus and smallpox included in new convention.

1933 International Sanitary Convention for Aerial Navigation signed at the Hague.

1944 1926 and 1933 conventions amended, by UNRRA, in Montreal (no conference).

1945 1944 convention signed by 17 States, in Washington, D.C.

1946 Constitution of the World Health Organization signed, in New York. Authority given to World Health Assembly to adopt quarantine regulations.

1951 International Sanitary Regulations adopted by Fourth World Health Assembly, in Geneva.

1952 Entry-into-force of International Sanitary Regulations, on 1 October.

1955 Additional Regulations amending the International Sanitary Regulations in respect of the yellow-fever clauses adopted by Eighth World Health Assembly, in Mexico City. These Additional Regulations came into force 1 October 1956.

1956 Additional Regulations amending the International Sanitary Regulations with respect to sanitary control of pilgrim traffic and to the form of International Certificate of Vaccination or Revaccination against Smallpox adopted by Ninth World Health Assembly, in Geneva.

ANNEX 2

RESPONSIBILITIES OF WHO MEMBER STATES UNDER INTERNATIONAL SANITARY CONVENTIONS, CODES, AND AGREEMENTS IN MARCH 1952

Countries and territories	(a) Convention 1903	(b) Pan Amer. Conv. & Code, 1905 and 1924	(c) Convention 1912	(d) Convention 1926	(e) Convention (Air) 1933	(f) Arrangement (BH) 1934	(g) Arrangement (CV) 1934	(h) Convention 1926/38	(i) Convention 1926/44	(j) Convention (Air) 1933/44	(k) Protocol Convention 1926/44/46	(l) Protocol Conv. (Air) 1933/44/46
AFGHANISTAN	—	—	—	+	—	—	—	+	—	—	—	—
ALBANIA	—	—	—	—	—	—	+	—	—	—	—	—
ARGENTINA	—	+	—	—	—	—	—	—	—	—	—	—
AUSTRALIA	+	—	+	+	+ R	+	[1]+	+	+ R	+ R	+	+
AUSTRIA	+	—	+	—	+	—	—	—	—	—	—	—
BELGIUM	+	—	+	+	+	[2]+	[3]+	+	+	+	+	+
BOLIVIA	—	+	—	—	+	—	—	—	—	—	—	—
BRAZIL	+	+	+	+ R	+ R	—	—	+	—	—	—	—
BULGARIA	—	—	+	—	—	—	—	—	—	—	—	—
BURMA	(+)	—	—	—	+	—	[4]—	(+)	—	—	—	—
BYELORUSSIAN SSR	(+)	—	(+)	(+)R	—	(+)	(+)	—	—	—	—	—
CAMBODIA	(+)	—	(+)	+	—	—	[5]—	(+)	+	+ R	+	+
CANADA [6]	—	—	—	+ R	—	—	+	—	+	+	+	+
CEYLON [7]	—	—	—	+	+	+	+	(+)	+	+ R	+	+
CHILE	—	—	—	+ R	+	—	—	—	—	—	—	—
CHINA	—	—	—	— R	—	—	—	—	+	+	+	+
COSTA RICA	—	+	—	—	—	—	—	—	—	—	—	—
CUBA	—	+	—	—	—	—	—	—	—	—	—	—
CZECHOSLOVAKIA	(+)	—	(+)	+	—	—	—	—	—	—	—	—
DENMARK	[8]+	—	+	+	—	[9]+	+	+	[10]+	—	[10]+	—
DOMINICAN REPUBLIC	—	+	—	—	+	—	—	—	+	+	+	+
ECUADOR	—	+	+	—	—	—	—	—	—	—	—	—
EGYPT	+	—	+	+	+	—	—	+	— R	— R	—	—
EL SALVADOR	—	+	—	+	—	—	—	—	—	—	—	—
ETHIOPIA	—	—	—	—	—	—	—	—	+	+	+	+
FINLAND	(+)	—	—	+ R	—	—	—	—	+	—	+	—

Explanation of signs and abbrevations :

\+ means that the country or territory was a party to the convention (or agreement);

(+) means that the country or territory was a party to the convention because the country responsible, or which was responsible at the time of signature, for its external affairs, was itself a party to the convention;

— means that the country or territory was not a party to the convention;

R means that the country or territory made technical reservations when signing or acceding to the convention.

The columns of the tables are lettered (*a*) to (*l*), under which letters conventions and agreements are listed in Article 105 of the International Sanitary Regulations.

Under the letter (*b*) the dates 1905, 1924 refer both to the Pan American Sanitary Convention of 1905 and to the Pan American Sanitary Code of 1924.

The letters BH in the column (*f*) refer to bill of health; the letters CV in the column (*g*) refer to consular visa.

RESPONSIBILITIES OF WHO MEMBER STATES UNDER INTERNATIONAL SANITARY CONVENTIONS, CODES, AND AGREEMENTS IN MARCH 1952

(continued)

Countries and territories	(a) Convention 1903	(b) Pan Amer. Conv. & Code, 1905 and 1924	(c) Convention 1912	(d) Convention 1926	(e) Convention (Air) 1933	(f) Arrangement (BH) 1934	(g) Arrangement (CV) 1934	(h) Convention 1926/38	(i) Convention 1926/44	(j) Convention (Air) 1933/44	(k) Protocol Convention 1926/44/46	(l) Protocol Conv. (Air) 1933/44/46
FRANCE (AND ALGERIA)	+	—	+	+	—	—	[11]+	+	+	+ R	+	+
GERMANY	+ R	—	+	+ R	+	+	[9]+	—	—	—	—	—
GREECE	—	—	—	+	+	[12]+	[13]+	+	+	+	+	+
GUATEMALA	—	+	+	—	—	—	—	—	—	—	—	—
HAITI	—	+	—	—	—	—	—	—	+	+	+	+
HONDURAS (REPUBLIC OF)	—	+	+	—	—	—	—	—	+	+	+	+
HUNGARY	+	—	+	+	—	[14]—	+	—	—	—	—	—
ICELAND	—	—	(+)	(+)	—	—	—	(+)	—	—	—	—
INDIA	+	—	—	+ R	+	[15]—	[16]+	+ R	+	+ R	+	+
INDONESIA (REPUBLIC OF)	—	—	—	(+)R	—	—	[17](+)	—	—	—	—	—
IRAN	+	—	+	— R	—	—	—	—	—	—	—	—
IRAQ	—	—	—	+	+ R	—	+	—	—	—	—	—
IRELAND (REPUBLIC OF)	(+)	—	(+)	+	—	—	—	—	—	—	—	—
ISRAEL	—	—	—	(+)	(+)	—	(+)	(+)	+	+	+	+
ITALY	+	—	+	+	[18]+	[18]+	[18]+	+	+	+	+	+
JAPAN	—	—	—	+ R	—	[19]—	[20]—	—	—	—	—	—
JORDAN	—	—	—	[21](+)	[22](+)	—	[22](+)	(+)	[21]+	[21]+	[21]+	[21]+
KOREA	—	—	—	(+)R	—	—	—	—	—	—	—	—
LAOS	(+)	—	(+)	(+)	—	—	[5]—	(+)	+	+ R	+	+
LEBANON	—	—	(+)	(+)	(+)	—	—	(+)	—	—	—	—
LIBERIA	—	—	—	—	+	—	—	—	—	—	—	—
LUXEMBOURG	+	—	+	+	—	—	—	—	+	+	+	+
MEXICO	+	+ R	+	+ R	—	—	—	—	—	—	—	—
MONACO	—	—	+	+	+	—	+	—	—	—	—	—
NETHERLANDS	+	—	[23]+	+	[24]+	+	+	—	[23]+	[23]+	[23]+	[23]+
NEW ZEALAND AND DEPENDENCIES	+	—	+	[25]+	—	+	+	+	+	+	+	+
NICARAGUA	—	+	—	—	—	—	—	—	+	+	+	+
NORWAY	+	—	+	—	—	—	[9]+	—	—	—	—	—
PAKISTAN	(+)	—	—	(+)R	(+)	—	(+)R	—	—	—	—	—
PANAMA (REPUBLIC OF)	—	+ R	+ R	—	—	—	—	—	—	—	—	—
PARAGUAY	—	+	—	—	—	—	—	—	—	—	—	—
PERU	—	+	—	—	—	—	—	—	— R	— R	—	—
PHILIPPINES (REPUBLIC OF THE)	(+)	—	(+)	(+)	(+)	—	—	—	+	+	+	+
POLAND	(+)	—	(+)	+	+	[19]—	—	—	+	+	+	+
PORTUGAL	+	—	+ R	— R	+	—	—	+	—	+	—	+
ROMANIA	+	—	+	+	+	—	+	—	—	—	—	—
SAUDI ARABIA	—	—	—	—	—	—	—	—	—	—	—	—

RESPONSIBILITIES OF WHO MEMBER STATES UNDER INTERNATIONAL SANITARY CONVENTIONS, CODES, AND AGREEMENTS IN MARCH 1952

(concluded)

Countries and territories	(a) Convention 1903	(b) Pan Amer. Conv. & Code, 1905 and 1924	(c) Convention 1912	(d) Convention 1926	(e) Convention (Air) 1933	(f) Arrangement (BH) 1934	(g) Arrangement (CV) 1934	(h) Convention 1926/38	(i) Convention 1926/44	(j) Convention (Air) 1933/44	(k) Protocol Convention 1926/44/46	(l) Protocol Conv. (Air) 1933/44/46
SOUTHERN RHODESIA (Associate Member State)	—	—	—	(+)	(+)	—	—	(+)	(+)	(+)	(+)	(+)
SPAIN	+	—	+ R	[26]+ R	—	—	—	—	—	—	—	—
SWEDEN	+	—	+ R	+	+	[9]+	+	+	—	—	—	—
SWITZERLAND (AND LIECHTENSTEIN)	+	—	+	—	—	—	—	—	—	—	—	—
SYRIA	—	—	(+)	(+)	(+)	—	—	(+)	+	+	+	+
THAILAND	—	—	— R	—	—	—	—	—	—	—	—	—
TURKEY	—	—	—	+ R	+	—	+	+	+	+	+	+
UKRAINIAN SSR	(+)	—	(+)	(+)R	—	(+)	(+)	—	—	—	—	—
UNION OF SOUTH AFRICA	—	—	—	+	+	+	+	+	+	+	+	+ R
USSR	+	—	+	+ R	—	+	+	—	—	—	—	—
UNITED KINGDOM	+ R	—	+	+ R	+	+	[27]+	+	+	+	+	+
UNITED STATES OF AMERICA	+ R	+	+ R	+ R	+ R	—	—	—	+	+	+	+
URUGUAY	—	+	+	—	—	—	—	—	—	—	—	—
VENEZUELA	—	+	—	+	—	—	—	—	—	—	—	—
VIET NAM	(+)	—	(+)	+	—	—	[5]—	(+)	+	+ R	+	+
YUGOSLAVIA	[28](+)	—	(+)	+	—	—	+	—	—	—	—	—

Notes

[1] In addition, this country signed a special agreement to this end with French Indochina (now Cambodia, Laos, Viet Nam).

[2] In addition, this country signed a special agreement to this end with Danzig, Denmark, Estonia, Germany, Greece, Japan, Poland, and Sweden.

[3] In addition, this country signed a special agreement to this end with France, Latvia, Lithuania, and Norway.

[4] Nevertheless, this country signed a special agreement to this end with British India (now India, Pakistan).

[5] Nevertheless, this country signed a special agreement to this end with Australia, British India (now India, Pakistan), Japan, Netherlands East Indies (now Indonesia, Netherlands New Guinea), Malaya, and Straits Settlements.

[6] Including Newfoundland and Labrador

[7] Including Maldive Islands

[8] Excluding Faroe Islands, Iceland, and Danish West Indies (now Virgin Islands of the USA)

[9] In addition, this country signed a special agreement to this end with Belgium

[10] Excluding Faroe Islands and Greenland

[11] In addition, this country signed a special agreement to this end with Belgium and the British Colonies.

[12] In addition, this country signed a special agreement to this end with Belgium and Hungary

[13] In addition, this country signed a special agreement to this end with Japan.

[14] Nevertheless, this country signed a special agreement to this end with Greece.

[15] Including Andaman and Nicobar Islands

[16] Nevertheless, this country signed a special agreement to this end with Burma.

[17] In addition, this country (formerly part of the Netherlands East Indies) signed a special agreement to this end with French Indochina (now Cambodia, Laos, Viet Nam).

[18] Specified " with Italian colonies and possessions "

[19] Nevertheless, this country signed a special agreement to this end with Belgium.

[20] Nevertheless, this country signed a special agreement to this end with Greece and French Indochina (now Cambodia, Laos, Viet Nam).

[21] Accession by United Kingdom of Great Britain and Northern Ireland for Palestine and for Transjordan

[22] Accession by United Kingdom of Great Britain and Northern Ireland for Palestine but not for Transjordan

[23] Ratification (1912) or accession (1944) limited to that part of the Kingdom which is situated in Europe

[24] Except the Netherlands East Indies (now Indonesia, Netherlands New Guinea), Surinam, and Curaçao (Netherlands West Indies)

[25] Including Western Samoa

[26] Without the Spanish Territories of the Gulf of Guinea

[27] In addition, this country signed a special agreement to this end with the French Colonies.

[28] For Montenegro only

ANNEX 3

POSITION OF STATES AND TERRITORIES UNDER THE INTERNATIONAL SANITARY REGULATIONS ON 1 OCTOBER 1956 *

I International Sanitary Regulations 1951.
II Additional Regulations 1955 (Yellow-fever clauses).
III Additional Regulations 1956 (Certificate of vaccination against smallpox).
\+ Bound without reservation.
R Bound with reservations.
— Not bound.
—[1] Not bound in so far as Article 1 of the Additional Regulations 1955 amends Articles 1, 3, 6, 20, 70 and 73 of the International Sanitary Regulations.
... Position not defined.

	I	II	III
Aden Colony	+	+	—
Aden Protectorate	+	+	—
Afghanistan	+	+	+
Albania	...	...	...
Angola	+	—	+
Argentina	+	+	+
Australia	—	—	—
Austria	+	+	+
Bahamas	+	+	—
Bahrain	+	+	—
Barbados	+	+	—
Basutoland	+	+	—
Bechuanaland	+	+	—
Belgian Congo and Ruanda-Urundi	+	+	+
Belgium	+	+	+
Bermuda	+	+	—
Bolivia	+	+	+
Brazil	+	+	+
British Guiana	+	+	—
British Honduras	+	+	—
British Solomon Islands	R	+	—
British Virgin Islands	+	+	—
Brunei	R	+	—
Bulgaria	...	...	...
Burma	—	—	—
Byelorussian SSR	...	...	...
Cambodia	+	+	+
Cameroons (French Adm.)	+	+	+
Canada	+	+	+
Cape Verde Islands	+	—	+
Ceylon	R	R	+
Chile	—	—	—
China	+	+	+
Colombia	...	...	...
Comoro Islands	+	+	+
Cook Islands	+	+	+
Costa Rica	+	+	+
Cuba	+	+	+
Cyprus	+	+	—
Czechoslovakia	...	...	...
Denmark	+	+	+
Dominica (Windward Is.)	R	+	—
Dominican Republic	+	+	+
Ecuador	+	+	+
Egypt	R	—	+
El Salvador	+	+	+
Ethiopia	+	+	+
Falkland Islands	R	+	—
Faroe Islands	—	—	—
Fiji and dependency	R	+	—
Finland	+	+	+
France	+	+	+
French Equatorial Africa	+	+	+
French Settlements in Oceania	+	+	+
French Somaliland	+	+	+
French West Africa	+	+	+
Gambia	R	—[1]	—
Germany, Fed. Rep. of	+	+	—
Gibraltar	+	+	—
Gilbert and Ellice Islands	R	+	—
Gold Coast	+	—[1]	—
Greece	R	—	+
Grenada (Windward Is.)	+	+	—
Greenland	—	—	—
Guam	+	+	+
Guatemala	+	+	+
Haiti	+	+	+
Honduras	+	+	+
Hong Kong	+	+	—
Hungary	...	...	...
Iceland	+	+	+
India	R	R	+
Indonesia	+	+	+
Iran	+	+	+
Iraq	+	—	—
Ireland	+	+	+
Israel	+	+	+

* See *Wkly epidem. Rec.*, 1956, **31**, 395.

	I	II	III
Italy	+	+	+
Jamaica	+	+	—
Japan	+	+	+
Jordan, Hashemite Kingdom of	+	+	+
Kenya	+	+	—
Korea	+	+	+
Kuwait	+	+	—
Laos	+	+	+
Lebanon	+	—	+
Leeward Islands	+	+	—
Liberia	+	+	+
Libya	+	—	+
Liechtenstein	—	—	—
Luxembourg	+	+	+
Macao	+	—	+
Madagascar and dependencies	+	+	+
Malaya, Federation of	+	—[1]	—
Maldive Islands	+	+	—
Malta	—	—	—
Mauritius	+	+	—
Mexico	+	+	+
Monaco	+	+	+
Morocco	+	+	+
Mozambique	+	—	+
Muscat and Oman	—	—	—
Nauru Island	...	...	...
Nepal	+	+	+
Netherlands	+	+	+
Netherlands Antilles	+	+	+
Netherlands New Guinea	+	+	+
New Caledonia	+	+	+
New Hebrides	+	+	+
New Zealand	+	+	+
Nicaragua	+	+	+
Nigeria, Federation of	+	—[1]	—
North Borneo	+	+	—
Norway	+	—	+
Pacific Islands (United States Trust Territories)	+	+	+
Pakistan	R	—	+
Panama	+	+	+
Panama Canal Zone	+	+	+
Papua-New Guinea	—	—	—
Paraguay	+	+	+
Peru	+	+	+
Philippines	R	+	+
Pitcairn Islands	R	+	—
Poland	...	...	...
Portugal: continental territory and Santa Maria Airport, Azores	+	+	+
Madeira and the Azores except Santa Maria Airport	+	—	+
Portuguese Guinea	+	—	+
Portuguese India	+	—	+
Portuguese Timor	+	—	+
Puerto Rico	+	+	+
Qatar	+	+	—
Rhodesia and Nyasaland, Federation of	+	+	+
Romania	...	...	...
St. Helena	+	+	—
St. Lucia (Windward Is.)	R	+	—
St. Pierre and Miquelon	+	+	+
St. Vincent (Windward Is.)	+	+	—
Samoa, American	+	+	+
Samoa, Western	+	+	+
S. Tome and Principe	+	—	+
Sarawak	R	+	—
Saudi Arabia	R	—	+
Seychelles	+	—[1]	—
Sierra Leone	+	—[1]	—
Singapore	—	—	—
Somalia (Italian Adm.)	+	+	+
Somaliland Protectorate	R	+	—
South-West Africa	R	R	+
Spain	+	+	+
Spanish Guinea	+	+	+
Spanish West Africa	+	+	+
Sudan	+	+	+
Surinam	R	+	+
Swaziland	+	+	—
Sweden	+	+	+
Switzerland	+	+	+
Syria	+	+	+
Tanganyika	+	+	—
Tangier Int. Zone	...	...	...
Thailand	+	+	+
Togoland (British Adm.)	+	+	+
Togo (French Adm.)	+	+	—
Tonga Islands	R	+	—
Trinidad and Tobago	+	+	—
Trucial States	+	+	—
Tunisia	+	+	+
Turkey	+	+	+
Uganda	+	+	—
Ukrainian SSR	...	...	...
Union of South Africa	R	R	+
USSR	...	...	...
United Kingdom	+	+	—
United States of America	+	+	+
Uruguay	+	+	+
Vatican City	+	+	+
Venezuela	+	+	+
Viet Nam	+	+	+
Virgin Islands (USA)	+	+	+
Yemen	+	+	+
Yugoslavia	+	+	+
Zanzibar	+	+	—

WHO PUBLICATIONS ON INTERNATIONAL QUARANTINE AND THE QUARANTINABLE DISEASES

All WHO publications on international quarantine and the quarantinable diseases are regularly indexed by the WHO Library, and references to them appear in the Bibliographical Section of the *Bulletin*.

Statistics on the quarantinable diseases are contained in the publication *Annual Epidemiological and Vital Statistics*, Part II of which is devoted to cases of, and deaths from, notifiable diseases, beginning with the six so-called " pestilential " diseases. To date, volumes in this series cover the years 1939-46, 1947-49, 1950, 1951, 1952, and 1953.

From time to time information on WHO's epidemiological intelligence services is published in the *Weekly Epidemiological Record*. A list of vaccination certificates required and the sanitary measures applied by countries and territories under the International Sanitary Regulations appears at least once yearly in the form of a supplement to the *Record*.

I. INTERNATIONAL QUARANTINE

1948

MORGAN, M. T.
Note on the estimation of rodent infestation in ships with a view to the issue of an International Certificate under Article 28 of the International Sanitary Convention 1926. *Bull. Wld Hlth Org.*, **1**, 63-67

WORLD HEALTH ORGANIZATION, EXPERT COMMITTEE ON QUARANTINE
Report on the first session. In: Reports of expert committees to the Interim Commission. *Off. Rec. Wld Hlth Org.*, **8**, 27-31

WORLD HEALTH ORGANIZATION, EXPERT SUB-COMMITTEE FOR THE REVISION OF THE PILGRIMAGE CLAUSES OF THE INTERNATIONAL SANITARY CONVENTIONS
Report on the first session. In: Reports of expert committees to the Interim Commission. *Off. Rec. Wld Hlth Org.*, **8**, 32-48

1949

DUGUET, J.
Disinsectization of aircraft: study made in connexion with the revision of international conventions. *Bull. Wld Hlth Org.*, **2**, 155-191

Epidemiological radio-broadcasts from Geneva *Chron. Wld Hlth Org.*, **3**, 35-38

International quarantine messages by radio: historical account. *Chron. Wld Hlth Org.*, **3**, 158-160

WORLD HEALTH ORGANIZATION, EXPERT COMMITTEE ON INTERNATIONAL EPIDEMIOLOGY AND QUARANTINE
Report on the first session. In: Reports of expert committees and other advisory bodies to the Executive Board. *Off. Rec. Wld Hlth Org.*, **19**, 5-15

WORLD HEALTH ORGANIZATION, EXPERT COMMITTEE ON INTERNATIONAL EPIDEMIOLOGY AND QUARANTINE, SECTION ON QUARANTINE
Report on the first session. In: Reports of expert committees and other advisory bodies to the Executive Board. *Off. Rec. Wld Hlth Org.*, **19**, 16-17

1951

DOROLLE, P.
Background to the International Sanitary Regulations. *Chron. Wld Hlth Org.*, **5**, 123-127

International Sanitary Regulations; World Health Organization Regulations No. 2. *Wld Hlth Org. techn. Rep. Ser.*, **41**, 100 pp.

New International Sanitary Regulations. *Chron. Wld Hlth Org.*, **5**, 223-230

1952

International certificates of vaccination. *Chron. Wld Hlth Org.*, **6**, 287-290

International Sanitary Regulations: Proceedings of the Special Committee and of the Fourth World Health Assembly on WHO Regulations No. 2. *Off. Rec. Wld Hlth Org.*, **37**, 443 pp.

This volume contains, in addition to the proceedings, a history of international quarantine, an explanatory memorandum on the Regulations, the complete text of the Regulations, a table of comparison with existing sanitary conventions and similar agreements, and an index to the Regulations.

1953

BARNES, J. M.
Toxic hazards of certain pesticides to man (*World Health Organization: Monograph Series*, No. 16), 129 pp.

UNITED STATES PUBLIC HEALTH SERVICE, COMMUNICABLE DISEASE CENTER

Techniques and materials for the disinsectization of aircraft. *Bull. Wld Hlth Org.*, **8**, 527-533

1954

International Sanitary Regulations; two years' experience. *Chron. Wld Hlth Org.*, **8**, 269-275

Ports approved and designated for the issue of deratting certificates and deratting exemption certificates. Situation as on 2 July 1954. *Wkly epidem. Rec.*, No. 26, *Suppl.* 2, 1-16

Proceedings and reports relating to international quarantine. Annual report of the Director-General on the International Sanitary Regulations; first report of the Committee on International Quarantine; relevant proceedings of the Seventh World Health Assembly. *Off. Rec. Wld Hlth Org.*, **56**, 121 pp.

1955

Airports designated in application of the International Sanitary Regulations. Situation as on 22 April 1955. *Wkly epidem. Rec.*, No. 16, *Suppl.* 3, 1-12

A list of the airports designated by health administrations, under the Regulations, as sanitary airports provided with direct transit areas (i.e., special areas " established in connexion with an airport, approved by the health authority concerned and under its direct supervision, for accommodating direct transit traffic and, in particular, for accommodating, in segregation, passengers and crews breaking their air voyage without leaving the airport.")

Tariffs of sanitary charges in force on 18 November 1955. *Wkly epidem. Rec.*, No. 46, *Suppl.* 5, 1-34

The International Sanitary Regulations expressly forbid a health authority to charge for any medical examination made in connexion with the Regulations or for any vaccination of a person on arrival and certificate thereof. Charges for deratting, disinfection, or disinsecting required under the Regulations must be uniform and uniformly applied, and must be moderate and not exceed the actual cost of the service rendered. This supplement contains a list of the actual charges made by various countries and territories for the sanitary operations performed.

Proceedings and reports relating to international quarantine. Second annual report of the Director-General on the International Sanitary Regulations; second report of the Committee on International Quarantine; relevant proceedings of the Eighth World Health Assembly (May 1955). *Off. Rec. Wld Hlth Org.*, **64**, 90 pp.

1956

Arrangements for vaccination against yellow fever. Situation as on 15 June 1956. *Wkly epidem. Rec.*, No. 24, *Suppl.* 2, 1-23

Under the International Sanitary Regulations an international certificate of vaccination against yellow fever is valid only if the vaccine used has been approved by WHO and if the vaccination centre has been designated by the health administration for the territory in which the centre is situated. This supplement contains a list of vaccines approved by WHO and the names of designated centres and, in a few instances, of vaccinators, as notified to the Organization by health administrations.

Proceedings and reports relating to international quarantine. Third annual report of the Director-General on the International Sanitary Regulations; third report of the Committee on International Quarantine; relevant proceedings of the Ninth World Health Assembly (May 1956). *Off. Rec. Wld Hlth Org.*, **72**, 92 pp.

WORLD HEALTH ORGANIZATION, EXPERT COMMITTEE ON INSECTICIDES
Specifications for pesticides: insecticides, rodenticides, molluscicides, and spraying and dusting apparatus, 400 pp.

A manual of the various specifications established by the WHO Expert Committee on Insecticides. Successor to the publication entitled *Insecticides: manual of specifications for insecticides and for spraying and dusting apparatus*, which was published in 1953.

(*See also* joint OIHP/WHO study-groups under the individual quarantinable diseases listed in section II.)

II. THE QUARANTINABLE DISEASES

CHOLERA

1947

BIRAUD, Y. & KAUL, P. M.
World distribution and prevalence of cholera in recent years. *Epidem. vital Statist. Rep.*, **1**, 141-152

Cholera in Egypt. *Chron. Wld Hlth Org.*, **1**, 141-145, 157-161

1948

OIHP/WHO JOINT STUDY-GROUP ON CHOLERA
First report. In: Reports of expert committees and other advisory bodies to the Interim Commission. *Off. Rec. Wld Hlth Org.*, **11**, 15-17

SHOUSHA, A. T.
Cholera epidemic in Egypt (1947): a preliminary report. *Bull. Wld Hlth Org.*, **1**, 353-381

1949

GALLUT, J.
Complete analysis of the specific antigen of the cholera vibrio and its practical application, *Bull. Wld Hlth Org.*, **2**, 39-43

JOINT OIHP/WHO STUDY-GROUP ON CHOLERA
Summary report on the second session. In: Reports of expert committees and other advisory bodies to the Executive Board. *Off. Rec. Wld Hlth Org.*, **19**, 24-26

1950

JOINT OIHP/WHO STUDY-GROUP ON CHOLERA
Report on the third session. *Wld Hlth Org. techn. Rep. Ser.*, **18**, 22 pp.

SOKHEY, S. & HABBU, M. K.
Antigenic structure of the cholera vibrio and protective power of the vaccine. *Bull. Wld Hlth Org.*, **3**, 55-61

SOKHEY, S. & HABBU, M. K.
Biological assay of cholera vaccine. *Bull. Wld Hlth Org.*, **3**, 43-53

SOKHEY, S. & HABBU, M. K.
Casein hydrolysate cholera vaccine. *Bull. Wld Hlth Org.*, **3**, 33-42

SOKHEY, S., HABBU, M. K. & BHARUCHA, K. H.
Hydrolysate of casein for the preparation of plague and cholera vaccines. *Bull. Wld Hlth Org.*, **3**, 25-31

1952

GHOSAL, S. C. & PAUL, B. M.
The value of Bandi's test in the rapid diagnosis of cholera. *Bull. Wld Hlth Org.*. **7**, 371-373

GILMOUR, C. C. B.
Period of excretion of *Vibrio cholerae* in convalescents. *Bull. Wld Hlth Org.*, **7**, 343-351

KOCH, W. & KAPLAN, D.
A cholera medium with more than tenfold yield. *Bull. Wld Hlth Org.*, **7**, 353-356

POLLITZER, R.
A note on the incidence and epidemiological importance of cholera carriers. *Bull. Wld Hlth Org.*, **7**, 359-369

SWAROOP, S. & POLLITZER, R.
World distribution of cholera endemicity. *Epidem. vital Statist. Rep.*, **5**, 569-589

WORLD HEALTH ORGANIZATION, EXPERT COMMITTEE ON CHOLERA
First report. *Wld Hlth Org. techn. Rep. Ser.*, **52**, 18 pp.

1954

POLLITZER, R.
Cholera studies: 1. History of the disease. *Bull. Wld Hlth. Org.*, **10**, 421-462

1955

POLLITZER, R.
Cholera studies: 3. Bacteriology. *Bull. Wld Hlth Org.*, **12**, 777-875

POLLITZER, R.
Cholera studies: 5. Bacteriophage investigations. *Bull. Wld Hlth Org.*, **13**, 1-25

POLLITZER, R.
Cholera studies: 6. Pathology. *Bull. Wld Hlth Org.*, **13**, 1075-1199

POLLITZER, R. & BURROWS, W.
Cholera studies: 4. Problems in immunology. *Bull. Wld Hlth Org.*, **12**, 945-1107

SWAROOP, S. & POLLITZER, R.
Cholera studies: 2. World incidence. *Bull. Wld Hlth Org.*, **12**, 311-358

1956

POLLITZER, R.
Cholera studies: 7. Practical laboratory diagnosis. *Bull. Wld Hlth Org.*, **14**, 705-793

PLAGUE

1948

JOINT OIHP/WHO STUDY-GROUP ON PLAGUE, etc.
First report. In: Reports of expert committees and other advisory bodies to the Interim Commission. *Off. Rec. Wld Hlth Org.*, **11**, 12-14

1949

GARNHAM, P. C. C.
Distribution of wild-rodent plague, *Bull. Wld Hlth Org.*, **2**, 271-278

JOINT OIHP/WHO STUDY-GROUP ON PLAGUE
Summary report on the second session. In: Reports of expert committees and other advisory bodies to the Executive Board. *Off. Rec. Wld Hlth Org.*, **19**, 18-21

KAUL, P. M.
Prevalence of plague in the world in recent years, *Epidem. vital Statist. Rep.*, **2**, 142-162

1950

SCHULZ, K. H.
Control of plague in Taranto, Italy, 1945/46: an account of a successful programme of rodent extermination. *Bull. Wld Hlth Org.*, **2**, 675-685

SOKHEY, S., HABBU, M. K. & BHARUCHA, K. H.
Hydrolysate of casein for the preparation of plague and cholera vaccines. *Bull. Wld Hlth Org.*, **3**, 25-31

WORLD HEALTH ORGANIZATION, EXPERT COMMITTEE ON PLAGUE
Report on the first session. *Wld Hlth Org. techn. Rep. Ser.*, **11**, 32 pp.

1951

DEVIGNAT, R.
Variétés de l'espèce *Pasteurella pestis*. Nouvelle hypothèse. *Bull. Wld Hlth Org.*, **4**, 247-263

SHARIF, M.
Spread of plague in the southern and central divisions of Bombay Province and plague endemic centres in the Indo-Pakistan sub-continent. *Bull. Wld Hlth Org.*, **4**, 75-109

1952

BALTAZARD, M. ET AL.
Le foyer de peste du Kurdistan. *Bull. Wld Hlth Org.*, **5**, 441-472

GIRARD, G.
Dépistage post mortem de la peste par ponctions d'organes. Trente années d'expérience à Madagascar. *Bull. Wld Hlth Org.*, **5**, 109-116

1953

BARRERA, J. M. DE LA
Rongeurs sauvages infectés par *Pasteurella pestis* en Argentine. *Bull. Wld Hlth Org.*, **9**, 701-705

DAVIS, D. H. S.
Plague in Africa from 1935 to 1949. A survey of wild rodents in African territories. *Bull. Wld Hlth Org.*, **9**, 665-700

GIRARD, G.
Méthodes permettant de différencier *P. pestis* de *P. pseudotuberculosis*. Possibilité d'uniformiser ces méthodes. *Bull. Wld Hlth Org.*, **9**, 645-653

LINK, V. B. & MOHR, C. O.
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The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature which are not mentioned. Proprietary names are distinguished by initial capital letters.

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